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UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.	22773-822.303
First Named Inventor	Avi Kopelman
Title	METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROST
Express Mail Label No.	EFS-WEB

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

1. [✓] **Fee Transmittal Form** (PTO/SB/17 or equivalent)
2. [ ] **Applicant asserts small entity status.** See 37 CFR 1.27
3. [ ] **Applicant certifies micro entity status.** See 37 CFR 1.29. Applicant must attach form PTO/SB/15A or B or equivalent.
4. [✓] **Specification** [*Total Pages* 45] Both the claims and abstract must start on a new page. *(See MPEP § 608.01(a) for information on the preferred arrangement)*
5. [✓] **Drawing(s)** (35 U.S.C. 113) [*Total Sheets* 8]
6. **Inventor's Oath or Declaration** [*Total Pages* 1] *(including substitute statements under 37 CFR 1.64 and assignments serving as an oath or declaration under 37 CFR 1.63(e))*
   a. [ ] Newly executed (original or copy)
   b. [✓] A copy from a prior application (37 CFR 1.63(d))
7. [✓] **Application Data Sheet** ** See note below.* See 37 CFR 1.76 (PTO/AIA/14 or equivalent)
8. **CD-ROM or CD-R** in duplicate, large table, or Computer Program (*Appendix*)
   [ ] Landscape Table on CD
9. **Nucleotide and/or Amino Acid Sequence Submission** (*if applicable, items a. – c. are required*)
   a. [ ] Computer Readable Form (CRF)
   b. [ ] Specification Sequence Listing on:
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ACCOMPANYING APPLICATION PAPERS

10. [ ] **Assignment Papers** (cover sheet & document(s)) Name of Assignee _____
11. [✓] **37 CFR 3.73(c) Statement** (*when there is an assignee*) [✓] **Power of Attorney**
12. [ ] **English Translation Document** (*if applicable*)
13. [ ] **Information Disclosure Statement** (PTO/SB/08 or PTO-1449)
    [ ] Copies of citations attached
14. [ ] **Preliminary Amendment**
15. [ ] **Return Receipt Postcard** (*MPEP § 503*) (*Should be specifically itemized*)
16. [ ] **Certified Copy of Priority Document(s)** (*if foreign priority is claimed*)
17. [ ] **Nonpublication Request** Under 35 U.S.C. 122(b)(2)(B)(i). Applicant must attach form PTO/SB/35 or equivalent.
18. [✓] **Other:** Certification and Request for Prioritized Examination

***Note**: (1) Benefit claims under 37 CFR 1.78 and foreign priority claims under 1.55 **must** be included in an Application Data Sheet (ADS).
(2) For applications filed under 35 U.S.C. 111, the application must contain an ADS specifying the applicant if the applicant is an assignee, person to whom the inventor is under an obligation to assign, or person who otherwise shows sufficient proprietary interest in the matter. See 37 CFR 1.46(b).

19. CORRESPONDENCE ADDRESS

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5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

ABSTRACT OF THE DISCLOSURE

Systems and methods are provided for preparation of orthodontics and prosthodontics. A method may include scanning a patient's teeth to form first 3D data of the patient's teeth including a removable element that obscures part of the dental surfaces of the patient's teeth and non-obscured tooth surfaces, removing the removable element form the patient's teeth so that the removable element no longer obscures the part of the dental surfaces of the patient's teeth, and scanning the previously obscured part of the dental surfaces of the patent's teeth and the non-obscured tooth surfaces.

CLAIMS

WHAT IS CLAIMED IS:

1. A system for scanning a patient's teeth for a dental procedure, the system comprising:

a hand-held intraoral scanner; and

a computer readable medium including instructions that when executed by a computer system, causes the computer system to:

receive first scan data of the patient's teeth from the hand-held intraoral scanner;

display, to a display, a model of the patient's teeth, wherein the model of the patient's teeth is based on the received first scan data of the patient's teeth;

receive user input defining a portion of the model to be removed;

remove, from the displayed model, the surface portion of the model to be removed according to the user input;

receive second scan data of the patient's teeth from the hand-held intraoral scanner, the second scan data including surface data of a physically changed portion of the patient's intra-oral cavity;

replace at least a portion of the removed portion of the model using the received second scan data of the patient's teeth including surface data of a physically changed portion of the patient's intraoral cavity; and

output, to the display, the model of the patient's teeth with the portion of the removed portion replaced using the received second scan data.

2. The system of claim 1, wherein the hand-held intraoral scanner comprises a probing member with a sensing face, an illumination unit, a light focusing optics defining one or more focal planes forward the sensing face, and a translation mechanism for displacing the focal plane relative to the sensing face.

3. The system of claim 2, wherein the system further comprises the computer system and the display; wherein the system further comprises a mouse or wherein the display comprises a touch screen display; and wherein the user input defining portions of the model to be removed is received by from the mouse or the touch screen display.

4. The system of claim 1, wherein the portion of the removed portion of the model is replaced with at least the portion of the received second scan data by registering the received second scan data with the model.

5. The system of claim 4, wherein the received second scan data is registered with the model by aligning identifying data of the received second scan data with corresponding parts of the model.

6. The system of claim 5, wherein the portion of the removed portion of the model is replaced with at least the portion of the received second scan data by further stitching the portion of the received second scan data with the model.

7. The system of claim 6, wherein the portion of the removed portion of the model is replaced with at least the portion of the received second scan data by further discarding a remainder of the received second scan data, the remainder including the identifying surface data, after stitching the portion of the received second scan data with the model.

8. The system of claim 1, wherein the computer readable medium further includes instructions that when executed by the computer system, causes the computer system to: mark, on the displayed model, the user input defined portion, after receiving the user input and before removing the portion of the model.

9. A method for scanning a patient's teeth for a dental procedure, the method comprising:

receiving first scan data of the patient's teeth from a hand-held intraoral scanner;

displaying, to a display, a model of the patient's teeth, wherein the model of the patient's teeth is based on the received first scan data of the patient's teeth;

receiving user input via the displayed model demarcating a portion of the model to be retained and a surface portion of the model to be replaced;

receiving second scan data of the patient's teeth from the hand-held intraoral scanner, the second scan data including surface data of a physically changed portion of the patient's intra-oral cavity;

replacing at least a portion of the portion of the model to be replaced according to the user input using at least a portion of the received second scan data of the patient's teeth including the physically changed portion; and

outputting, to the display, the model of the patient's teeth with the portion of the removed portion replaced using the received second scan data.

10. The method of claim 9, further comprising marking an area on the displayed model associated with the received user input.

11. The method of claim 9, wherein replacing at least the portion of the portion of the model to be replaced according to the user input using at least the portion of the second scan data comprises registering the second scan data with the model by aligning identifying data of the second scan data with corresponding parts of the model.

12. The method of claim 11, wherein replacing at least the portion of the portion of the model to be replaced according to the user input using at least the portion of the second scan data further comprises stitching the portion of the second scan data with the model.

13. The method of claim 12, wherein replacing at least the portion of the portion of the model to be replaced according to the user input using at least the portion of the second scan data further comprises discarding a remainder of the second scan data, including the identifying surface data, after stitching the portion of the second 3scan data with the model.

14. The method of claim 9, wherein the model of the patient's teeth comprises a tooth preparation having a finish line, wherein a portion of the finish line is obscured or distorted, and wherein the physical change results in the finish line not being obscured or distorted.

15. The method of claim 9, wherein the model of the patient's teeth comprises a tooth preparation that accurately represents a surface of a physical preparation of the patient, and wherein the method further comprises analyzing the tooth preparation of the model to determine whether the surface of the physical preparation is suitable for a dental prosthesis; and wherein the physical change is a physical modification of the surface of the physical preparation of the patient.

16. The method of claim 15, wherein the dental prosthesis comprises a dental crown and wherein the tooth preparation analysis comprises analysis of the model with respect to a virtual model of an opposing dentition of an opposite jaw to determine whether the tooth preparation would result in an inadequate structure for the dental crown.

17. A system for intraorally scanning a patient's teeth for a dental procedure, the system comprising:

a hand-held intraoral scanner; and

a computer readable medium including instructions that when executed by a computer system, causes the computer system to:

receive first scan data of the patient's teeth from the hand-held intraoral scanner;

display, to a display, a model of the patient's teeth, wherein the model of the patient's teeth is based on the received first scan data of the patient's teeth;

receive user input defining a portion of the model to be removed;

after receiving the user input, remove, from the displayed model, the portion of the model to be removed according to the user input;

after removing the portion of the model, receive second scan data of the patient's teeth from the hand-held intraoral scanner;

register the second scan data with the model by aligning identifying data of the second scan data with corresponding parts of the model;

replace at least a portion of the removed surface portion of the model using at least a portion of the received second scan data of the patient's teeth;

discarding a remainder of the second scan data, including the identifying data, after registering the second scan data with the model; and

output, to the display, the model of the patient's teeth with the portion of the removed portion replaced using the received scan data.

18. The system of claim 17, wherein the hand-held intraoral scanner comprises a probing member with a sensing face, an illumination unit, a light focusing optics defining one or more focal planes forward the sensing face, and a translation mechanism for displacing the focal plane relative to the sensing face.

19. The system of claim 18, wherein the system further comprises the computer system and the display; wherein the system further comprises a mouse or wherein the display comprises a touch screen display; and wherein the user input defining portions of the model to be removed is received by from the mouse or the touch screen display.

20. The system of claim 17, wherein the portion of the removed portion of the model is replaced using at least a portion of the received second scan data by registering the second scan data with the model.

WSGR Docket No. 22773-822.303

PATENT APPLICATION

METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS

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METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS

CROSS REFERENCE

[0001] This application is a continuation of 15/050,673, filed February 23, 2016, which is a continuation of U.S. Patent Application No. 13/574,723, filed January 4, 2013, now U.S. Patent No. 9,299,192, issued March 29, 2016, which is a U.S. National Phase Application under 35 U.S.C. § 371 of International Application No. PCT/IL11/00574, filed July 19, 2011, which claims priority to U.S. Provisional Patent Application No. 61/365,556, filed July 19, 2010, the entire contents of which are incorporated herein by reference.

FIELD OF THE INVENTION

[0002] This invention relates to methods and systems that are useful in dentistry and other fields and that are particularly useful in prosthodontics and/or orthodontics.

BACKGROUND OF THE INVENTION

[0003] There are many procedures associated with the intra oral cavity in which a precise three-dimensional virtual representation of the intra oral cavity can be useful to the dental practitioner.

[0004] Such virtual representations (also referred to interchangeably herein as "virtual models", "computer models", "3D numerical entities", and so on) enable the practitioner to study the intra oral cavity of individual patients via a computer system, in a similar manner to the study of the traditional physical plaster model. Furthermore, three-dimensional numerical entities of the intra oral cavity also allow the practitioner to study methods or approaches when dealing with particular dental problems of any given patient, and for the design of physical entities, for example prostheses, dental brackets, aligners and so on, in relation therewith. For example, in prosthodontics, a computer model of a patient's teeth may be manipulated to provide machining data to manufacture a physical model of the intra oral cavity, and/or to design and manufacture a coping and/or a prosthesis, while in orthodontics a computer model of a patient's teeth may be manipulated to enable a dental appliance, including for example orthodontic brackets and/or aligners, to be designed and manufactured, and/or for designing a treatment.

[0005] A parameter used in the design and manufacture of a dental prosthesis, such as a crown or bridge, is the finish line, or transition boundary between the prosthesis and the dental preparation, and this needs to be precisely defined in three-dimensions. Obtaining finish line coordinates from a

computer virtual model is more efficient and often more accurate than from a plaster cast, and moreover facilitates the production of such a prosthesis, for example via CNC machining, rapid prototyping, or other computerized technologies, if desired.

[0006] However, it is often the case that when scanning the intra oral cavity to obtain 3D data of the preparation and finish line, on which the virtual model is based, part of the finish line, and possibly also the shoulder and other parts of the preparation, may be obscured by soft tissues such as the gum that, no longer being supported by the dental surfaces that have been removed, deform to cover at least a part of the finish line on the prepared dental site.

[0007] Additionally or alternatively, part or all of the finish line may be obscured by other agents or materials, including, for example, accumulation of one or more of saliva, blood, lubricant used with a dental drill, debris resulting from working the dental site, and so on.

[0008] Similar issues may arise when scanning the intra oral cavity to obtain 3D data of the position and orientation of a dental implant in relation to the surrounding portions of the intra-oral cavity, and in addition the corresponding impression abutment (also referred to herein as a scanning body) may partially obscure part of the intra-oral cavity.

[0009] Similarly, there are other situations in which a virtual model of a physical item, obtained from scanning the physical item, is partially obscured or incomplete, or in which part of the physical item needs to be subsequently modified after obtaining the virtual model. Such situations would conventionally require a rescanning of the entire physical item, and this may involve significant additional time, inconvenience and, where the physical item is a part of the body of a patient (such as for example the intra oral cavity), this may also involve significant patient discomfort.

SUMMARY OF THE INVENTION

[0010] Herein "intra oral cavity" (also referred to interchangeably herein as dental cavity) is taken to include, but not be limited to, one or more real teeth and/or one or more prosthetic teeth and/or part of one or more real teeth, of one jaw or of both jaws of a patient, and/or can also include all the real teeth and/or prosthetic teeth in one or both jaws, and/or adjacent gingiva and other adjacent objects of the patient, and/or can include a physical model or other physical representation of one or more or all the real teeth, and/or one or more or all of the prosthetic teeth, and/or part of one or more or all the real teeth, of one jaw or of both jaws, and/or of adjacent gingiva and/or other adjacent objects, of the patient.

[0011] Herein, "dental material" refers to any material associated with dental structures of the intra oral cavity, including but not limited to natural dental materials such as for example enamel, dentine,

pulp, dental roots, and also including non-natural dental materials from which items such as for example metallic and non-metallic fillings, restorations, crowns, bridges, copings, preparations, and so on, are made from.

[0012] Herein, "dental clinic" refers to the interface between a dental practitioner and a patent, and thus includes any physical entity, in particular a clinic, in which there is interaction between a dental patient and a dental practitioner. While "dental practitioner" typically refers to a dentist, doctor or dental technician, it also includes herein all other caregivers, including for example dental surgeons, orthodontists, prosthodontists, dental assistants or any other caregiver or professional that may interact with a dental patient during the course of a dental treatment, or that may be involved in determining, preparing or providing dental treatment to a patient, particularly prosthodontic treatment and/or orthodontic treatment. While "dental patient" (also referred to interchangeably herein as "patient") typically refers to a person requiring the dental services of a dental practitioner, it also includes herein any person regarding whom it is desired to create a 3D numerical model of the intra oral cavity thereof, for example for the purpose of practicing the same or for carrying out research.

[0013] The term "prosthesis" is herein taken to include any restoration and any onlays, such as crowns and bridges, for example, and inlays, such as caps, for example, or veneering, or any other artificial partial or complete denture.

[0014] The term "virtual", applied herein with respect to models, manipulation of models, and so on, in particular 3D virtual models, for example, refers to being created, simulated, manipulated, carried out, and so on by means of a CAD/CAM system, a computer, a computer network, or the like, i.e., in a computer environment, particularly with reference to digital dentistry.

[0015] While the term "preparation" typically refers to the stump and including the finish line and shoulder that is left of the tooth that is to be replaced by the prosthesis - typically a crown - and on which the crown or other prosthesis is to be mounted or seated, the term "preparation" herein also includes artificial stumps, pivots, cores and posts, or other devices that may be implanted in the intraoral cavity in such a position or in a position that is optimal for implanting the crown or other prosthesis.

[0016] The term "prosthodontic procedure" refers, *inter alia*, to any procedure involving the intraoral cavity and directed to the design, manufacture or installation of a dental prosthesis at a dental site within the intraoral cavity, or a real or virtual model thereof, or directed to the design and preparation of the dental site to receive such a prosthesis.

[0017] The term "3D virtual model" is used herein synonymously with digital model, virtual model, 3D virtual model, 3D model, three dimensional model, 3D numerical entity, numerical entity, computer model, 3D computer model, dimensional data, 3D digitized data, 3D representation, and other such terms, and relates to a virtual representation in a computer environment of a real object, such as for example a dentition or at least a part of the intraoral cavity, or of a real (physical) model thereof, for example of a plaster model or a stone model of the dentition or any dental structure. In particular a virtual dental model is one example of such a 3D virtual model of a dental structure.

[0018] The term "physical part" is used herein, synonymously with "real part" to refer to a physical object, in particular a physical dental object having a real (physical) surface and included but not limited to part or all of the dentition of the intraoral cavity including dies, a coping, a prosthesis, and so on, or to a physical dental model of part or all of the dentition of the intraoral cavity including dies, a coping, a prosthesis, and so on.

[0019] The term "scanning" and its analogues refer to any procedure directed at obtaining 3D topographic data of a surface, particularly of a dental surface, wherein to provide a 3D virtual model, and thus includes mechanical-based or other contact systems and methods, typically based on 3D probes for example, and/or any other noncontact systems and methods included but not limited to optical-based systems and methods and/or radiation-based systems and methods, including for example confocal-based systems and methods, for example as disclosed in WO 00/08415, the contents of which are incorporated herein in their entirety by reference, x-ray systems and methods including CT systems and methods, laser scanners, ultrasound scanners, and/or indeed any other suitable system and method for providing 3D virtual model.

[0020] The terms "tool" and "machining tool" are taken herein interchangeably to include any tool that is adapted for material removal, and may include inter alia mechanical tools such as drills for example, laser tools such as for example laser drills or cutters, ultrasonic tools such as for example ultrasonic cutters, and so on. Preferably, the machining paths and material removal characteristics of such tools can be finely controlled, typically by computer systems or other automated means.

[0021] According to a first aspect of the invention there is provided a computer based method for modifying a virtual model of a physical structure, comprising:

(A) displaying an image of said virtual model on a display operatively connected to a computer system;

(B) identifying at least a portion of said virtual model that is desired to be modified by interacting with the displayed image,

(C) modifying said virtual model by replacing in the computer system at least said portion of said virtual model with additional 3D data obtained from the physical structure to provide a modified virtual model.

[0022] For example, the physical structure can comprise any one of an intra-oral cavity of a patient and a physical dental model representative of said intra-oral cavity. Additionally or alternatively, said virtual model includes a first three dimensional (3D) virtual model representative of a first physical part of the physical structure, and step (A) comprises providing to the computer system said first 3D virtual model and displaying on said display a first display image corresponding to said first 3D virtual model.

[0023] For example, step (B) comprises identifying on said first display image at least a first display image portion thereof by interacting with said display, said first display image portion corresponding to said portion of said virtual model, and said portion of said virtual model being representative of a first physical portion of said first physical part, and optionally step (C) comprises, subsequent to step (B):

causing the computer system to at least one of delete, remove and replace said portion of said virtual model by applying a corresponding function, i.e., a corresponding computer-implemented function (i.e. a delete function, a remove function or a replace function, respectively) to said first display image portion via interaction with said first display image on said display, to provide a modified first 3D virtual model;

providing said additional 3D data in the form of a second 3D virtual model representative of a second physical part of said physical structure, wherein a spatial disposition of said second physical part with respect to said first physical part is known or determinable;

virtually registering said second 3D virtual model with respect to said modified first 3D virtual model to provide said modified virtual model wherein said portion of said virtual model is replaced with a corresponding part of said second 3D virtual model representative of a second physical portion of said second physical part;

outputting said modified virtual model from said computer system.

[0024] Alternatively, steps (B) and (C) comprise:

providing said additional 3D data in the form of a second 3D virtual model representative of a second physical part of said physical structure, wherein a spatial disposition of said second physical part with respect to said first physical part is known or determinable;

virtually registering said second 3D virtual model with respect to said first 3D virtual model and further displaying in said display a second display image corresponding to said second 3D virtual model in registry with said first 3D virtual model;

identifying on said first display image at least a first display image portion thereof by interacting with said display, said first display image portion corresponding to said portion of said virtual model, and said portion of said virtual model being representative of a first physical portion of said first physical part;

causing the computer system to at least one of delete, remove and replace said portion of said virtual model by applying a corresponding function, i.e., a corresponding computer-implemented function, i.e., a corresponding computer-implemented function (i.e. a delete function, a remove function or a replace function, respectively) to said first display image portion via interaction with said first display image on said display, to provide said modified virtual model, wherein said portion of said virtual model is replaced with a corresponding part of said second 3D virtual model representative of a second physical portion of said second physical part;

outputting said modified virtual model from said computer system.

[0025] For example, said first display image is visually encoded in a different manner to said second display image to facilitate identifying said first display image portion.

[0026] Additionally or alternatively, said second physical part at least partially overlaps said first physical portion of said first physical part of said physical structure to provide data on said spatial disposition of said second physical part with respect to said first physical part.

[0027] Additionally or alternatively, said second physical portion of said second physical part spatially corresponds to but is topographically different from said first physical portion of said first physical part.

[0028] Additionally or alternatively, said corresponding part of said second 3D virtual model spatially corresponds to but is topographically different from said portion of said virtual model.

[0029] Additionally or alternatively, said first virtual model part represents a corresponding said first physical part of the physical structure, wherein said first virtual model part is considered to fail to comply with a predetermined requirement therefor. For example, said predetermined requirement comprises providing high surface definition of a surface of interest in said first physical part of the physical structure. For example, at least a part of said surface of interest in said first portion of said first physical part was obscured when the said first 3D virtual model was created, and wherein said second portion of said second physical part corresponds to said first portion of said first physical part

wherein said at least a part of said surface of interest is now unobscured. For example, said first portion of said first physical part was obscured with a material including one or more of saliva, debris, blood, and wherein said second portion of said second physical part corresponds to said first portion of said first physical part wherein said material has been removed from said surface of interest. For example, said first portion of said first physical part was obscured with an artifact, and wherein said second portion of said second physical part corresponds to said first portion of said first physical part wherein said artifact has been removed. For example, said artifact comprises an impression abutment or any other structure mounted onto a dental implant that is embedded in said physical structure.

[0030] Additionally or alternatively, said predetermined requirement comprises providing a surface of interest in said first physical part of the physical structure that is configured for enabling a prosthesis to be mounted with respect thereto. For example, at least a part of said surface of interest in said first portion of said first physical part is inadequate for enabling a prosthesis to be mounted with respect thereto, and wherein said second portion of said second physical part corresponds to said first portion of said first physical part wherein said at least a part of said surface of interest has been physically altered. For example, where said at least a part of said surface of interest has been physically altered via a material removal operation wherein to modify the topology of said at least a part of said surface of interest. An example of this is where said at least a part of said surface of interest comprises a finish line of a tooth onto which it is desired to mount the prosthesis, and said finish line is inadequately defined in said first portion of said first physical part, but where said finish line is adequately defined in said second portion of said second physical part.

[0031] For example, said at least part of said surface of interest comprises a preparation surface of a preparation of a tooth onto which it is desired to mount the prosthesis, wherein in said first portion of said first physical part said preparation surface is inadequate for mounting the prosthesis thereto, and wherein in said second portion of said second physical part said preparation surface is inadequate for mounting the prosthesis thereto.

[0032] Additionally or alternatively, said first virtual model part is distorted or deficient and fails to properly represent a corresponding said first physical part of the physical structure.

[0033] Additionally or alternatively, the method further comprises manufacturing a physical dental model of the intra oral cavity based on said modified virtual model.

[0034] Additionally or alternatively, the method further comprises designing an orthodontic treatment plan based on said modified virtual model.

[0035] Additionally or alternatively, the method further comprises manufacturing a dental aligner based on said modified virtual model.

[0036] Additionally or alternatively, the method further comprises manufacturing orthodontic appliances based on said modified virtual model.

[0037] Additionally or alternatively, the method further comprises manufacturing a dental prosthesis based on said modified virtual model.

[0038] According to the first aspect of the invention there is also provided a computer system configured for modifying a virtual model of a physical structure, comprising:

a display configured for displaying a display image of said virtual model and for identifying at least a portion of said virtual model that is desired to be modified responsive to interaction of a user with the displayed display image, and further configured for modifying said virtual model by replacing in the computer system at least said identified portion of said virtual model with additional 3D data obtained from the physical structure to provide a modified virtual model.

[0039] For example, the computer system can configured for applying a computer implemented method as defined above for the first aspect of the invention, *mutatis mutandis*.

[0040] According to the first aspect of the invention there is also provided a computer readable medium that embodies in a tangible manner a program executable for:

(A) enabling displaying a display image of a virtual model of a physical structure;

(B) enabling interaction with the displayed display image to identify at least a portion of said virtual model that is desired to be modified

(C) enabling modifying said virtual model by replacing at least said identified portion of said virtual model with additional 3D data obtained from the physical structure to provide a modified virtual model.

[0041] For example, the program can be configured for applying a computer implemented method as defined above for the first aspect of the invention, *mutatis mutandis*. Additionally or alternatively, the computer readable medium comprises any one of optical discs, magnetic discs, magnetic tapes, or solid state memory storage.

[0042] According to a second aspect of the invention there is provided a computer based method for modifying a virtual model of a physical structure, comprising:

(A) providing to the computer system said virtual model obtained from the physical structure;

(B) providing to the computer system additional 3D data obtained from at least a part of the physical structure;

(C) identifying at least one portion of the virtual model that is desired to be modified with at least a part of said additional 3D data; and

(D) modifying the virtual model in the computer system at least by replacing said at least one identified portion of said virtual model with said at least part of said 3D data to provide a modified virtual model.

[0043] For example, step (A) comprises displaying a display image of said virtual model on a display operatively connected to a computer system. For example, step (B) comprises displaying a display image of said modified virtual model on said display. For example, step (C) comprises identifying said at least one portion of the virtual model on said display. For example, step (C) comprises interacting with said display images on said display to thereby replace said corresponding portion of said virtual model with said portion of said additional 3D data.

[0044] Additionally or alternatively, said additional 3D data includes at least one portion thereof that corresponds to but is different from a corresponding portion of said virtual model.

[0045] For example, said physical structure comprises any one of an intra-oral cavity of a patient and a physical dental model representative of said intra-oral cavity.

[0046] Additionally or alternatively, said virtual model includes a first three dimensional (3D) virtual model representative of a first physical part of the physical structure, and step (A) comprises providing to the computer system said first 3D virtual model and displaying on said display a first display image corresponding to said first 3D virtual model. For example, the method can comprise identifying on said first display image at least a first display image portion thereof by interacting with said display, said first display image portion corresponding to said portion of said virtual model, and said portion of said virtual model being representative of a first physical portion of said first physical part.

[0047] For example, step (C) comprises:

causing the computer system to at least one of delete, remove and replace said portion of said virtual model by applying a corresponding function, i.e., a corresponding computer-implemented function (i.e. a delete function, a remove function or a replace function, respectively) to said first display image portion via interaction with said first display image on said display, to provide a modified first 3D virtual model;

providing said additional 3D data in the form of a second 3D virtual model representative of a second physical part of said physical structure, wherein a spatial

disposition of said second physical part with respect to said first physical part is known or determinable;

virtually registering said second 3D virtual model with respect to said modified first 3D virtual model to provide said modified virtual model wherein said portion of said virtual model is replaced with a corresponding part of said second 3D virtual model representative of a second physical portion of said

outputting said modified virtual model from said computer system.

[0048] For example, steps (B) and (C) comprise:

providing said additional 3D data in the form of a second 3D virtual model representative of a second physical part of said physical structure, wherein a spatial disposition of said second physical part with respect to said first physical part is known or determinable;

virtually registering said second 3D virtual model with respect to said first 3D virtual model and further displaying in said display a second display image corresponding to said second 3D virtual model in registry with said first 3D virtual model;

identifying on said first display image at least a first display image portion thereof by interacting with said display, said first display image portion corresponding to said portion of said virtual model, and said portion of said virtual model being representative of a first physical portion of said first physical part;

causing the computer system to at least one of delete, remove and replace said portion of said virtual model by applying a corresponding function (i.e. a delete function, a remove function or a replace function, respectively) to said first display image portion via interaction with said first display image on said display, to provide said modified virtual model, wherein said portion of said virtual model is replaced with a corresponding part of said second 3D virtual model representative of a second physical portion of said second physical part;

outputting said modified virtual model from said computer system.

[0049] For example, said first display image is visually encoded in a different manner to said second display image to facilitate identifying said first display image portion.

[0050] Additionally or alternatively, said second physical part at least partially overlaps said first physical portion of said first physical part of said physical structure to provide data on said spatial disposition of said second physical part with respect to said first physical part.

[0051] Additionally or alternatively, said second physical portion of said second physical part spatially corresponds to but is topographically different from said first physical portion of said first physical part.

[0052] Additionally or alternatively, corresponding part of said second 3D virtual model spatially corresponds to but is topographically different from said portion of said virtual model.

[0053] Additionally or alternatively, said first virtual model part represents a corresponding said first physical part of the physical structure, wherein said first virtual model part is considered to fail to comply with a predetermined requirement therefor. For example, said predetermined requirement comprises providing high surface definition of a surface of interest in said first physical part of the physical structure. For example, at least a part of said surface of interest in said first portion of said first physical part was obscured when the said first 3D virtual model was created, and wherein said second portion of said second physical part corresponds to said first portion of said first physical part wherein said at least a part of said surface of interest is now unobscured. For example, said first portion of said first physical part was obscured with a material including one or more of saliva, debris, blood, and wherein said second portion of said second physical part corresponds to said first portion of said first physical part wherein said material has been removed from said surface of interest. For example, said first portion of said first physical part was obscured with an artifact, and wherein said second portion of said second physical part corresponds to said first portion of said first physical part wherein said artifact has been removed. For example, said artifact comprises an impression abutment or any other structure mounted onto a dental implant that is embedded in said physical structure.

[0054] Additionally or alternatively, said predetermined requirement comprises providing a surface of interest in said first physical part of the physical structure that is configured for enabling a prosthesis to be mounted with respect thereto. For example, at least a part of said surface of interest in said first portion of said first physical part is inadequate for enabling a prosthesis to be mounted with respect thereto, and wherein said second portion of said second physical part corresponds to said first portion of said first physical part wherein said at least a part of said surface of interest has been physically altered. For example, where said at least a part of said surface of interest has been physically altered via a material removal operation wherein to modify the topology of said at least a part of said surface of interest. An example of this is where said at least a part of said surface of interest comprises a finish line of a tooth onto which it is desired to mount the prosthesis, and said finish line is inadequately defined in said first portion of said first physical part, but where said finish line is adequately defined in said second portion of said second physical part.

[0055] For example, said at least a part of said surface of interest comprises a preparation surface of a preparation of a tooth onto which it is desired to mount the prosthesis, wherein in said first portion of said first physical part said preparation surface is inadequate for mounting the prosthesis thereto, and wherein in said second portion of said second physical part said preparation surface is inadequate for mounting the prosthesis thereto.

[0056] Additionally or alternatively, said first virtual model part is distorted or deficient and fails to properly represent a corresponding said first physical part of the physical structure.

[0057] Additionally or alternatively, the method further comprises manufacturing a physical dental model of the intra oral cavity based on said modified virtual model.

[0058] Additionally or alternatively, the method further comprises designing an orthodontic treatment plan based on said modified virtual model.

[0059] Additionally or alternatively, the method further comprises manufacturing a dental aligner based on said modified virtual model.

[0060] Additionally or alternatively, the method further comprises manufacturing orthodontic appliances based on said modified virtual model.

[0061] Additionally or alternatively, the method further comprises manufacturing a dental prosthesis based on said modified virtual model.

[0062] According to the second aspect of the invention there is also provided a computer system configured for modifying a virtual model of a physical structure, the system:

(A) configured for enabling said virtual model obtained from the physical structure to be provided thereto;

(B) configured for enabling additional 3D data obtained from at least a part of the physical structure to be provided thereto;

(C) configured for enabling identifying at least one portion of the virtual model that is desired to be modified with at least a part of said additional 3D data;

(D) configured for modifying the virtual model at least by replacing said corresponding portion of said virtual model with said portion of said additional 3D data to provide a modified virtual model.

[0063] For example, the computer system comprises a display operatively connected to the computer system, and the computer system can configured for applying a computer implemented method as defined above for the second aspect of the invention, *mutatis mutandis*.

[0064] According to the second aspect of the invention there is also provided a computer readable medium that embodies in a tangible manner a program executable for:

(A) enabling a virtual model obtained from the physical structure to be provided thereto;

(B) enabling additional 3D data obtained from at least a part of the physical structure to be provided thereto;

(C) enabling identifying at least one portion of the virtual model that is desired to be modified with at least a part of said additional 3D data;

(D) enabling modifying the virtual model at least by replacing said corresponding portion of said virtual model with said portion of said additional 3D data to provide a modified virtual model.

[0065] For example, the program can be configured for applying a computer implemented method as defined above for the second aspect of the invention, *mutatis mutandis*. Additionally or alternatively, the computer readable medium comprises any one of optical discs, magnetic discs, magnetic tapes, or solid state memory storage.

[0066] According to a third aspect of the invention there is provided a computer based method for modifying a virtual model of a physical structure, comprising:

(A) providing to the computer system said virtual model obtained from the physical structure;

(B) providing to the computer system additional 3D data obtained from the physical structure, said additional 3D data including at least one portion thereof that corresponds to but is different from a corresponding portion of said virtual model;

(C) modifying the virtual model in the computer system at least by replacing said corresponding portion of said virtual model with said portion of said additional 3D data to provide a modified virtual model.

[0067] For example, step (A) comprises displaying a display image of said virtual model on a display operatively connected to a computer system For example, step (B) comprises identifying said corresponding portion of said virtual model on said display.

[0068] Additionally or alternatively step (C) comprises interacting with said display image on said display to thereby replace said corresponding portion of said virtual model with said portion of said additional 3D data.

[0069] Additionally or alternatively said physical structure comprises any one of an intra-oral cavity of a patient and a physical dental model representative of said intra-oral cavity.

[0070] Additionally or alternatively said virtual model includes a first three dimensional (3D) virtual model representative of a first physical part of the physical structure, and step (A) comprises providing to the computer system said first 3D virtual model and displaying on said display a first

display image corresponding to said first 3D virtual model. For example, the method comprises identifying on said first display image at least a first display image portion thereof by interacting with said display, said first display image portion corresponding to said portion of said virtual model, and said portion of said virtual model being representative of a first physical portion of said first physical part.

[0071] For example, step (C) comprises:

causing the computer system to at least one of delete, remove and replace said portion of said virtual model by applying a corresponding function, i.e., a corresponding computer-implemented function (i.e. a delete function, a remove function or a replace function, respectively) to said first display image portion via interaction with said first display image on said display, to provide a modified first 3D virtual model;

providing said additional 3D data in the form of a second 3D virtual model representative of a second physical part of said physical structure, wherein a spatial disposition of said second physical part with respect to said first physical part is known or determinable;

virtually registering said second 3D virtual model with respect to said modified first 3D virtual model to provide said modified virtual model wherein said portion of said virtual model is replaced with a corresponding part of said second 3D virtual model representative of a second physical portion of said second physical part;

outputting said modified virtual model from said computer system.

[0072] For example, steps (B) and (C) comprise:

providing said additional 3D data in the form of a second 3D virtual model representative of a second physical part of said physical structure, wherein a spatial disposition of said second physical part with respect to said first physical part is known or determinable;

virtually registering said second 3D virtual model with respect to said first 3D virtual model and further displaying in said display a second display image corresponding to said second 3D virtual model in registry with said first 3D virtual model;

identifying on said first display image at least a first display image portion thereof by interacting with said display, said first display image portion corresponding to said portion of said virtual model, and said portion of said virtual model being representative of a first physical portion of said first physical part;

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causing the computer system to at least one of delete, remove and replace said portion of said virtual model by applying a corresponding function, i.e., a corresponding computer-implemented function (i.e. a delete function, a remove function or a replace function, respectively) to said first display image portion via interaction with said first display image on said display, to provide said modified virtual model, wherein said portion of said virtual model is replaced with a corresponding part of said second 3D virtual model representative of a second physical portion of said second physical part;

outputting said modified virtual model from said computer system.

[0073] For example, said first display image is visually encoded in a different manner to said second display image to facilitate identifying said first display image portion.

[0074] Additionally or alternatively, said second physical part at least partially overlaps said first physical portion of said first physical part of said physical structure to provide data on said spatial disposition of said second physical part with respect to said first physical part.

[0075] Additionally or alternatively, said second physical portion of said second physical part spatially corresponds to but is topographically different from said first physical portion of said first physical part.

[0076] Additionally or alternatively, said corresponding part of said second 3D virtual model spatially corresponds to but is topographically different from said portion of said virtual model.

[0077] Additionally or alternatively, said first virtual model part represents a corresponding said first physical part of the physical structure, wherein said first virtual model part is considered to fail to comply with a predetermined requirement therefor.

[0078] For example, said predetermined requirement comprises providing high surface definition of a surface of interest in said first physical part of the physical structure. For example, at least a part of said surface of interest in said first portion of said first physical part was obscured when the said first 3D virtual model was created, and wherein said second portion of said second physical part corresponds to said first portion of said first physical part wherein said at least a part of said surface of interest is now unobscured. For example, said first portion of said first physical part was obscured with a material including one or more of saliva, debris, blood, and wherein said second portion of said second physical part corresponds to said first portion of said first physical part wherein said material has been removed from said surface of interest. For example, said first portion of said first physical part was obscured with an artifact, and wherein said second portion of said second physical part corresponds to said first portion of said first physical part wherein said artifact has been

removed. For example, said artifact comprises an impression abutment or any other structure mounted onto a dental implant that is embedded in said physical structure.

[0079] For example, said predetermined requirement comprises providing a surface of interest in said first physical part of the physical structure that is configured for enabling a prosthesis to be mounted with respect thereto. For example, at least a part of said surface of interest in said first portion of said first physical part is inadequate for enabling a prosthesis to be mounted with respect thereto, and wherein said second portion of said second physical part corresponds to said first portion of said first physical part wherein said at least a part of said surface of interest has been physically altered. For example, where said at least a part of said surface of interest has been physically altered via a material removal operation wherein to modify the topology of said at least a part of said surface of interest. An example of this is where said at least a part of said surface of interest comprises a finish line of a tooth onto which it is desired to mount the prosthesis, and said finish line is inadequately defined in said first portion of said first physical part, but where said finish line is adequately defined in said second portion of said second physical part.

[0080] For example, said at least a part of said surface of interest comprises a preparation surface of a preparation of a tooth onto which it is desired to mount the prosthesis, wherein in said first portion of said first physical part said preparation surface is inadequate for mounting the prosthesis thereto, and wherein in said second portion of said second physical part said preparation surface is inadequate for mounting the prosthesis thereto.

[0081] Additionally or alternatively, said first virtual model part is distorted or deficient and fails to properly represent a corresponding said first physical part of the physical structure.

[0082] Additionally or alternatively, the method further comprises manufacturing a physical dental model of the intra oral cavity based on said modified virtual model.

[0083] Additionally or alternatively, the method further comprises designing an orthodontic treatment plan based on said modified virtual model.

[0084] Additionally or alternatively, the method further comprises manufacturing a dental aligner based on said modified virtual model.

[0085] Additionally or alternatively, the method further comprises manufacturing orthodontic appliances based on said modified virtual model.

[0086] Additionally or alternatively, the method further comprises manufacturing a dental prosthesis based on said modified virtual model.

[0087] According to the third aspect of the invention there is also provided a computer system configured for modifying a virtual model of a physical structure, the system being:

(A) configured for enabling said virtual model obtained from the physical structure to be provided thereto;

(B) configured for enabling additional 3D data obtained from the physical structure to be provided thereto, said additional 3D data including at least one portion thereof that corresponds to but is different from a corresponding portion of said virtual model;

(C) configured for modifying the virtual model at least by replacing said corresponding portion of said virtual model with said portion of said additional 3D data to provide a modified virtual model.

[0088] For example, the computer system comprises a display operatively connected to the computer system, and the computer system can configured for applying a computer implemented method as defined above for the third aspect of the invention, *mutatis mutandis*.

[0089] According to the third aspect of the invention there is also provided a computer readable medium that embodies in a tangible manner a program executable for:

(A) enabling said virtual model obtained from the physical structure to be provided thereto;

(B) enabling additional 3D data obtained from the physical structure to be provided thereto, said additional 3D data including at least one portion thereof that corresponds to but is different from a corresponding portion of said virtual model;

(C) modifying the virtual model at least by replacing said corresponding portion of said virtual model with said portion of said additional 3D data to provide a modified virtual model.

[0090] For example, the program can be configured for applying a computer implemented method as defined above for the third aspect of the invention, *mutatis mutandis*. Additionally or alternatively, the computer readable medium comprises any one of optical discs, magnetic discs, magnetic tapes, or solid state memory storage.

[0091] It is readily apparent that in at least some embodiment according to one or more of the first, second or third aspects of the invention, the second 3D virtual model contains new or additional 3D data of the first physical part of said physical structure in a region thereof corresponding to the first virtual model part that was deleted or removed or replaced. Said differently, the second 3D virtual model contains 3D data representative of a region of the first physical part of said physical structure having a spatial relationship with the rest of the first physical part corresponding to the virtual spatial relationship of first virtual model part of said first 3D virtual model (that was deleted or removed or replaced) with respect to the respective rest of the first 3D virtual model.

[0092] In at least some embodiments of the invention, said physical structure is a dental structure. For example, said physical structure comprises at least a part of an intra-oral cavity of a patient. For example, said physical structure comprises a physical dental model representative of at least a part of an intra-oral cavity of a patient. In other embodiments of the invention, the physical structure may be a non-dental structure.

[0093] It is readily apparent that in at least some embodiment according to one or more of the first, second or third aspects of the invention, the first 3D virtual model is analyzed by a user with respect to criteria to determine the suitability of the first physical part for the purpose of allowing a prosthesis to be seated thereon. While this analysis may be a visual and intuitive analysis by the user, the analysis may be optionally carried out by the computer system (or indeed by a different computer system) using suitable software, wherein the analysis may be fully automated or interactive with the user. The analysis may also be configured for identifying regions of the first physical part (i.e., on the first 3D virtual model) that require physical change- for example, the criteria may include the amount of original tooth reduction required at various points on the tooth to allow for good prosthesis seating and to allow for a minimum prosthetic thickness that is consistent with mechanical integrity standards therefor. The analysis software may further identify these regions and mark them automatically. Furthermore, the deleting/removing/replacing step can also be carried out automatically once these regions are marked, either immediately, or following a confirmation command from the user. Thereafter the user can rework the physical part, in particular the preparation in the regions thereof previously identified by the analysis software and now erased and missing in the modified first 3D virtual model.

[0094] Some specific embodiments according to at least one of the first, second or third aspect of the invention are provided below:

Embodiment A

[0095] (a) A first virtual model (computer 3D model) VM1 of a physical part RM1 of the intra-oral cavity (typically of a patient, in vivo, but alternatively the scan may be of a physical dental model, or of an impression of the intra oral cavity, or of an impression a physical dental model) including tooth or teeth of interest is created, for example by scanning with an optical scanner, x-ray scanner, laser scanner or other scanner.

[0096] (b) Virtual model VM1 is displayed (and optionally magnified and/or manipulated) to visually check the model.

[0097] (c) A part DVMI of the virtual model is “deleted” (or otherwise removed) interactively on the screen by the user, resulting in a modified first virtual model VM1’.

[0098] (d) For example, this deleted part DVM1 of the model may not be acceptable and needs to be better defined for some dental procedure. The deleted part DVM1 may correspond, for example, to a part of a dental surface DRM1 that was not clearly defined in the first virtual model VM1 because, for example, during the initial scan that resulted in VM1, the corresponding part DRM1 of the physical dental surface was covered with saliva, blood, debris, or otherwise obscured by another element such as for example part of the gums, cheek, tongue, dental instruments etc.

[0099] (e) For example, the dental procedure may be providing a dental prosthesis, and the deleted part DVM1 may be part of the finish line that was not clear.

[0100] (f) A second virtual model VM2 is created, representing the part DRM1 of the physical dental surface plus additional identifying surface data ID.

[0101] (g) For example, the part DRM1 of the physical dental surface is cleaned up and/or unobstructed, and then rescanned. The scanning procedure also includes scanning an additional part P2 the real dental surface surrounding the part DRM1 to obtain additional identifying surface data ID.

[0102] (h) The second virtual model VM2 is then manipulated in the computer system to register it onto the modified first virtual model VM1’. In this connection, the identifying surface data ID of second virtual model VM2 may be useful as it may be aligned with corresponding parts of the modified first virtual model VM1’, since the surface data for part P2 of the real physical dental surface should be nominally identical in both scans.

[0103] (j) In this aligned position, a part DVM2 of the second virtual model VM2 fits in and corresponds to the deleted portion DVM1, and part DVM2 is then stitched to modified first virtual model VM1’ to create a further modified first virtual model VM1”. The remainder of the second virtual model VM2, including the identifying surface data ID may then be discarded.

[0104] (k) The further modified first virtual model VM1” thus replaces the undesired part DVM1 of the original virtual model VM1 with new data.

[0105] (l) The above steps (b) to (k) may be repeated as often as desired.

[0106] A feature of at least this embodiment is that the user only needs to "correct" parts of the original virtual model of the dental surface, and does not need to rescan everything, should part of the virtual model not be acceptable.

Embodiment B

[0107] (A) This is similar to Embodiment A, *mutatis mutandis*, the main difference being that the physical part RM1 of the intra-oral cavity includes a removable artifact which may be temporarily obscuring part of the dental surfaces.

[0108] (B) For example, the artifact may be a scanning body or impression abutment or any other structure that is mounted onto a dental implant and projects into the intra oral cavity so that the spatial orientation and other characteristics of the implant (which is already anchored in the jaw and thus cannot be seen) with respect to the dental surfaces may be derived from the position/orientation of the artifact. Alternatively, the artifact may be a prosthesis, such as a crown for example, that is mounted to the implant or that is temporarily seated onto a preparation.

[0109] (C) The first virtual scan thus includes the artifact and all the other dental areas of interest, but the presence of the artifact makes it difficult to obtain a full scan of the dental surface as the artifact may be too close in parts to the dental surfaces (e.g. an adjacent tooth).

[0110] (D) The part of the virtual model corresponding to the dental surface (and possibly also part of the artifact) is deleted or otherwise removed interactively in a similar manner to steps (b) and (c) above for Embodiment A, *mutatis mutandis*.

[0111] (E) The artifact is removed from the intraoral cavity and an area of the dental surfaces including the area that was not fully defined previously is scanned, and in the absence of the artifact, full definition should be achieved.

[0112] (F) The original virtual model in (A) for Embodiment B is then modified with the new scan data obtained in (E), in a manner similar to steps (f) to (j) above for Embodiment A, *mutatis mutandis*.

[0113] (G) If necessary, the artifact itself (or part thereof) may also be scanned separately to further modify the original virtual model, if part of the artifact was deleted in step (D).

[0114] A feature of at least this embodiment is that it allows obtaining a virtual model of the intra oral cavity including such an artifact, wherein even the parts of the dental surfaces originally obscured by the artifact can be fully defined with respect thereto.

Embodiment C

[0115] (i) This is also similar to Embodiment A, *mutatis mutandis*, the main difference being that the physical part RM1 of the intra-oral cavity is well defined in the virtual model, but the physical part RM1 is not suitable for the dental procedure.

[0116] (ii) For example, the part RM1 may be a dental preparation for a dental prosthesis (e.g. a crown), and analysis of the first dental model with respect to a virtual model of the opposing dentition of the opposite jaw reveals that the form of the preparation would result in an inadequate structure for the prosthesis. For example, the dental preparation is too long, and would result in the thickness of the crown at the cusp being too thin and thus mechanically weak.

[0117] (iii) For example, a technique based on the virtual occlusion map invention, as disclosed in US 6,334,853, assigned to Cadent Ltd, may be used for determining the distances between the preparation and the opposed dental surfaces, which provides a measure of the corresponding thickness of the respective dental prosthesis.

[0118] (iv) The part of the first virtual model that corresponds to the unsuitable part of the dental preparation is then deleted, as in step (c) above for Embodiment A, *mutatis mutandis*.

[0119] (v) The real dental preparation is also modified by the dental practitioner in the areas found to be unsuitable in (ii), and thereafter the preparation is scanned in the newly worked area, also including additional part of the preparation that was not altered.

[0120] (vi) The scan data corresponding to the unaltered area is used for aligning the new scan data for the worked part of the dental preparation in a similar manner to (h), (j), (k) above for Embodiment A, *mutatis mutandis*, to provide a modified virtual model.

[0121] (vii) The newly modified virtual model of (vi) is checked as in (ii) and (iii), and if necessary, steps (ii) to (vi) repeated as often as required, until the newly modified virtual model has a geometry for the dental preparation (corresponding to the real geometry of the dental preparation) that is adequate for a prosthesis.

[0122] In an alternative application of embodiment C in orthodontics, a patient's dentition is scanned and an orthodontic treatment is planned. Prior to commencing the treatment it is determined that the treatment may be improved by removing or filing some teeth. In such a case the areas including the removed/modified teeth are rescanned and these replace the parts of the original virtual model corresponding to these teeth. A new orthodontic treatment can then be planned based on the updated virtual model, and aligners and/or other orthodontic appliances can then be manufactured.

[0123] A feature of at least this embodiment is that it allows the dental practitioner to modify a dental structure (such as for example a dental preparation or a missing or modified tooth) in a quick and easy manner with a minimum of scanning after the initial virtual scan.

[0124] According to at least one aspect of the invention there is provided a system and method are provided for modifying a virtual model of a physical structure by displaying an image of the virtual model, deleting 3D data of parts of the virtual model by interacting with the displayed image, and

replacing at least a portion of the deleted 3D data with new 3D data obtained from the physical structure to provide a modified virtual model.

BRIEF DESCRIPTION OF THE DRAWINGS

[0125] In order to understand the invention and to see how it may be carried out in practice, embodiments will now be described, by way of non-limiting example only, with reference to the accompanying drawings, in which:

[0126] **Fig. 1** shows, by way of a flow chart, a method m accordance with a first embodiment of the invention.

[0127] **Fig. 2** shows various elements of a system used for providing and manipulating a virtual dental model according to the embodiment of Fig. 1.

[0128] **Fig. 3** schematically illustrates providing a first virtual model to the computer system of Fig. 2, and interacting with the display thereof.

[0129] **Fig. 4** schematically illustrated a modified first computer model as displayed by the computer system of Fig. 2.

[0130] **Fig. 5** schematically illustrates providing a second virtual model to the computer system of Fig. 2.

[0131] **Fig. 6** schematically illustrates manipulating the second virtual model of Fig. 5 into registration with the modified computer model of Fig. 4.

[0132] **Fig. 7** schematically illustrates an example of physical part used in conjunction with a second embodiment of the invention.

[0133] **Fig. 8** schematically illustrates an example of physical part used in conjunction with a third embodiment of the invention.

[0134] **Fig. 9** shows, by way of a flow chart, a method in accordance with an alternative variation of the first embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0135] A computer-based method, particularly useful for creating, manipulating and refining a virtual dental model, according to a first embodiment of the invention and designated with reference numeral **400** is illustrated in Fig. 1.

[0136] In step **410** carried out by the method **400**, an accurate **3D** representation, i.e., a first **3D** virtual model of a physical structure, in this example the intraoral cavity, is obtained. This first **3D** virtual model is generally designated with the numeral **VM1** in the accompanying figures. As used herein, and as already discussed, the intra oral cavity can include one or more real teeth and/or one

or more prosthetic teeth and/or part of one or more real teeth of one jaw or of both jaws of a patient, and/or can also include all the real teeth and/or prosthetic teeth in one or both jaws, and/or adjacent gingiva and other adjacent objects of the patient, and/or can include a physical model or other physical representation of one or more or all the real teeth, and/or one or more or all of the prosthetic teeth, and/or part of one or more or all the real teeth, of one jaw or of both jaws, and/or of adjacent gingiva and/or other adjacent objects, of the patient.

[0137] Referring also to Fig. **3**, the first **3D** virtual model **VM1** is thus representative of a physical part **RM1** of the intra-oral cavity (typically of a patient, in vivo, but alternatively the first **3D** virtual model **VM1** may be of a physical dental model, as will become clearer below) including a tooth or teeth of interest.

[0138] The first **3D** virtual model **VM1**, i.e. the **3D** digitized data of the intraoral cavity, including the dentition and associated anatomical structures of a patient, may be provided using any suitable scanning equipment for scanning a patient's teeth, for example by scanning the intra oral cavity of the patient in vivo, or via scanning of a physical model or an impression thereof. Referring to Fig. **2**, this may be done for example at a dental clinic **22** by the dentist or another dental practitioner. The dental clinic **22** is typically linked to one or more dental labs **26**, and possibly also to a dental service center **23** via a communication means or network such as for example the Internet or other suitable communications medium such as an intranet, local access network, public switched telephone network, cable network, satellite communication system, and the like, indicated by the cloud at **24**. The dental lab **26** is particularly adapted for defining the finish line, as well as for other tasks such as designing prostheses, designing and manufacturing physical models of the dentition, and possibly also for manufacturing at least an external profile of the prostheses. The dental service center **23** is particularly adapted for manufacturing dental hardware that requires a very high degree of precision, for example inner surfaces of prostheses that are required to match external surfaces of copings, and possibly also the copings themselves.

[0139] Such scanning equipment may include any suitable scanner, for example, an optical hand-held scanner **31** (or any other suitable optical scanner, mechanical scanner, ultrasound scanner, radiation-based scanner, including for example x-ray scanner, or other laser scanner, or any other suitable scanner) that is used by the practitioner to acquire the **3D** data for example by directly scanning the patient's oral cavity. For example, a hand held apparatus including a probe for determining three dimensional structure by confocal focusing of an array of light beams can be used, for example as manufactured under the name of CB-CAD or as disclosed in WO 00/08415, the contents of which are incorporated herein by reference in their entirety, and in which in at least one

embodiment, the apparatus is configured for determining surface topology of a portion of a three-dimensional structure, such as the intra oral cavity for example, the apparatus comprising:

a probing member with a sensing face;

an illumination unit for providing an array of incident light beams transmitted towards the structure along an optical path through said probing unit to generate illuminated spots on said portion;

a light focusing optics defining one or more focal planes forward said probing face at a position changeable by said optics, each light beam having its focus on one of said one or more focal plane;

a translation mechanism for displacing said focal plane relative to the structure along an axis defined by the propagation of the incident light beams;

a detector having an array of sensing elements for measuring intensity of each of a plurality of light beams returning from said spots propagating through an optical path opposite to that of the incident light beams;

a processor coupled to said detector for determining for each light beam a spot-specific position, being the position of the respective focal plane of said one or more focal planes yielding maximum measured intensity of the returned light beam, and based on the determined spot-specific positions, generating data representative of the topology of said portion.

[0140] The **3D** data obtained by the scanner **31** may then be stored in a suitable storage medium, for example a memory in a computer workstation or system **32**, which includes a display **33**, such as for example a computer screen, operatively connected thereto. Typically, the 3D data can be sent over a suitable communication network **24** to the dental lab **26**, for further processing. Optionally, the **3D** data may be sent via communication network **24** to the dental service center **23**, for the further processing.

[0141] The computer system **32** is configured for enabling the user to interact with images displayed in the display **33**, and comprises an input device **40** configured for enabling the user to point to displayed objects on the display, and/or to interact with the display **33** to at least enable deletion and/or replacement of images thereon, as will become clearer below. The input device **40** may comprise, for example, a wand **34** (for example a light sensitive wand, or light pen) and/or a mouse **35**, and/or the display **33** may incorporate the input device, being configured as a touch sensitive screen configured for at least enabling deletion and/or replacement of images thereon wherever a displayed image on the screen is touched or stroked by the user.

[0142] Optionally, color data of the intraoral cavity may also be provided together with the **3D** data, and thus the virtual model comprises coordinates and corresponding color information of the dental surfaces scanned. Examples of such scanners are disclosed in co-pending application entitled "**METHOD AND APPARATUS FOR COLOUR IMAGING A THREE-DIMENSIONAL STRUCTURE**", published under US 2006-0001739, and which is assigned to the present Assignee. The contents of the aforesaid co-pending application are incorporated herein by reference in their entirety, and at least one embodiment of such a scanner comprises a device configured for determining the surface topology and associated color of at least a portion of a three dimensional structure, such as the intra oral cavity for example, comprising:

(a) scanning means adapted for providing depth data of said portion corresponding to a two-dimensional reference array substantially orthogonal to a depth direction;

(b) imaging means adapted for providing two-dimensional color image data of said portion associated with said reference array; wherein the device is adapted for maintaining a spatial disposition with respect to said portion that is substantially fixed during operation of said scanning means and said imaging means.

[0143] Such scanning means (a) may comprise the at least one embodiment of the apparatus disclosed in disclosed in WO 00/08415 and for example as defined above in connection therewith.

[0144] Alternatively or additionally, the clinic **22** may include equipment for obtaining a negative casting of a patient's teeth. In this case, the negative cast or impression can be taken of the patient's teeth, in a manner known in the art, and this physical negative model is dispatched to one of the dental labs **26** that is equipped to prepare from the negative model a physical positive cast suitable for scanning. The positive cast may be scanned at the dental lab 26 by any method known in the art, including for example x-ray scanning, laser scanning or using the aforesaid probe manufactured under the name of CB-CAD or as disclosed in WO 00/08415 and referred to above. The **3D** data is then transmitted over the network **24** to the service center **23**. Alternatively, the positive cast may be dispatched to the service center **23** by the dental clinic **22** and scanned at the service center **23** to obtain the **3D** data. Alternatively, the service center **23** produces a positive model from the negative model and is scanned thereat, or sent to the dental clinic **22** to be scanned thereat. Alternatively, the negative model is scanned, either at the dental lab **26** or at the service center **23**.

[0145] Alternatively, the negative model provided by the clinic **22** is sent to the service center **23**, either directly by the clinic **22**, or indirectly via the dental lab **26**, and a composite physical positive-negative model may be manufactured from the original negative model. Thereafter, the positive-negative model may be processed to obtain 3D digitized data, for example as disclosed in US

6,099,314, assigned to the present Assignee, and the contents of which are incorporated herein in their entirety.

[0146] Alternatively, the 3D first virtual model **VM1** may be obtained in any other suitable manner, including other suitable intra oral scanning techniques, based on optical methods, direct contact or any other means, applied directly to the patient's dentition. Alternatively, X-ray based, CT based, MRI based, or any other type of scanning of the patient or of a positive and/or negative model of the intra-oral cavity may be used. As is clear from the aforegoing, the dimensional data of the respective virtual model may be associated with a complete dentition, or of a partial dentition, for example such as a preparation only of the intra oral cavity.

[0147] Once the 3D digitized data is obtained, the virtual model **VM1** is input to suitable computer system **32**, and the next steps **420** to **470**, are performed with the aid of computer system **32**. In alternative variations of this embodiment, the scanner **31** provides raw data to the computer system **32** which then generates the first virtual model **VM1** therein from this raw data.

[0148] In step **420**, the first virtual model **VM1** is displayed (and optionally magnified and/or manipulated) in display **33** as a first display image **DI1** corresponding to the first virtual model **VM1**.

[0149] For example, the display **33** can be a 2D display such as conventional 2D display screen, and thus the images are 2D images. Alternatively, the display can be a 3D display and the images are also 3D images. Alternatively, the display can be a 2D stereoscopic display and the images are also 2D stereoscopic images.

[0150] The first virtual model **VM1** can then be checked visually by the user via the image **DI1** on the display **33**. This image **DI1** can be virtually manipulated on the display **33** with respect to up to six degrees of freedom (i.e., translated and/or rotated with respect to one or more of three mutually orthogonal axes) by suitably manipulating the first virtual model **VM1** within the computer environment of system **32**, using suitable user controls (hardware and/or virtual) to enable viewing the first virtual model **VM1** from any desired direction on the screen **33** via the corresponding display image **DI1** on the display **33**, enabling the first virtual model **VM1** to be visually checked by the user.

[0151] According to this embodiment, steps **430** to **470** are implemented when part of the first virtual model **VM1**, designated **DVM1**, is considered to be unsuitable or undesired, while concurrently it is desired to retain another part of the first virtual model **VM1**.

[0152] For example, this part **DVM1** of the first virtual model **VM1** may be considered by the user as not acceptable or desirable and needing to be better defined for a particular dental procedure of

interest. The part **DVM1** can correspond, for example, to a part of a real dental surface **DRM1** of the real (physical) part **RM1** of the intra-oral cavity that was not sufficiently clearly defined in the first virtual model **VM1**. For example, during the initial 3D data collection step, for example via scanning, that resulted in the first virtual model **VM1** being generated, the corresponding part **DRM1** of the physical dental surface was covered with foreign material, such as for example saliva, blood, debris, or was otherwise obscured by another element such as for example part of the gums, cheek, tongue, dental instruments, artifacts, etc. Alternatively, for example, during the initial 3D data collection step, for example via scanning, that resulted in the first virtual model **VM1** being generated, the virtual part **DVM1** may be distorted or otherwise defective and does not properly correspond to real part **DRM1**, for example due to some defect in the actual scanning process, while the real part **DRM1** itself is acceptable.

[0153] In step **430** this part **DVM1** of the first virtual model **VM1** is marked on the first image of the first virtual model **VM1** on the display **33**. By "marked" it is meant that this zone or area of the first image **DI1** is at least identified by the user, and may optionally include interacting with the display **33** so that a visual mark is included in the image to show and demarcate this area on the image **DI1** that is on the display **33**. For example, wand **34**, operatively connected to the computer system **32** can be used for interacting with the display **33**, wherein a visual mark is displayed wherever the tip **39** of the wand 34 touches the image **DI1** on the display **33**.

[0154] In step **440**, and referring also to Fig. **4**, part **DVM1** of the first virtual model **VM1** is then "deleted" or otherwise removed or replaced interactively on the display **33** by the user, resulting in the first virtual model **VM1** being modified to become a modified first virtual model **VM1'**, by passing the tip of the wand **34** over the marked area of the image **DI1**. The deletion, removal or replacement of part **DVM1** is responsive to the application of a special corresponding computer-implemented function (i.e. a corresponding deletion function, removal function or replacement function) via the computer system **32**. The special computer-implemented function is, for ease of reference referred to herein as the "delete" function (and includes at least one of a remove function, remove command, delete command, replace command, or replace function) of the computer system **32**, and operates to modify for example the first virtual model **VM1** by at least one of deleting, removing or replacing a part thereof when "delete" function is activated, i.e., when the "delete" function is applied to the marked area of the image **DI1**.

[0155] According to this special "delete" function, the computer system **32** is configured for causing at least the deletion and/or removal and/or replacement of data corresponding to part **DVM1** of the first virtual model **VM1**, when a corresponding part of the display image **DI1** on the display **33** is

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correspondingly deleted or removed or replaced on the display **33**, which in tum is accomplished by interaction by the user, such as touching the desired parts of the image **DI1** on the display **33** with the wand **34** when the "delete" function is activated.

[0156] Although in at least one embodiment the display image **DI1** is a two dimensional image, each element or pixel of such a 2D display image **DI1** corresponds to a unique part of the three-dimensional data of the first virtual model **VM1**, as viewed in a viewing direction corresponding to image **DI1**, and thus the computer system is configured for deleting or removing or replacing such parts of the three-dimensional data from the first virtual model **VM1** when the corresponding elements or pixels in the image **DI1** are "touched" on the display **33** and the computer system **32** has the special "delete" function activated.

[0157] Particularly where the first virtual model **VM1** represents a three dimensional surface of the physical part **RM1**, it is readily understood that the deleted or removed or replaced portions of the first virtual model **VM1** are also three dimensional surfaces.

[0158] The above interaction for deletion or removal with respect to image **DI1** can alternatively be accomplished without recourse to touching the display **33**. For example, the computer system may be additionally or alternatively configured for enabling parts of the image **DI1** to be deleted or removed by interaction therewith via mouse **35** or any other suitable input device **40**.

[0159] The first virtual model **VM1** is thus modified by the loss of the three dimensional data corresponding to part **DVM1**, effectively generating a modified first 3D virtual model **VM1'**.

[0160] For example, the dental procedure of interest may be providing a dental prosthesis, and the deleted or removed part **DVM1** may be part of the finish line **550** of a preparation **555** that exists in real dental surface **DRM1**, but failed to be represented at all, or to be clearly represented, in the first virtual model **VM1**, for example due to obfuscation thereof by foreign material, distortion of the scanned data, etc, as discussed above, for example.

[0161] The dental surface **DRM1** is thus considered the "first physical portion" of step **440**.

[0162] In step **450**, and referring also to Fig. **5**, a second virtual model **VM2** is created, representing a second part **RM2** of the physical dental structure. The second virtual model **VM2** comprises a virtual part **DVM2** that represents the part **DRM1** of the physical dental surface, plus additional identifying surface data **ID** that represents a part **P2** of the real dental surface in proximity to part **DRM1**, and thus second part **RM2** at least partially overlaps with the physical part **RM1**. Before doing so, the part **DRM1** of the physical dental surface is cleaned up and/or unobstructed, and for example rescanned to obtain second virtual model **VM2**. The scanning procedure thus also includes

scanning the additional part **P2** the real dental surface surrounding the part **DRM1** to obtain additional identifying 3D surface data **ID**.

[0163] It is to be noted that in a variation of step **450**, for example the virtual part **DVM1** may be distorted or otherwise defective and does not properly correspond to real part **DRM1**, for example due to some defect in the actual scanning process thereof, while the real part **DRM1** itself is acceptable. In such a case, second virtual model **VM2** is created, representing a second part **RM2** of the physical dental structure, and likewise the second virtual model **VM2** comprises a virtual part **DVM2** that represents the same part **DRM1** of the physical dental surface, plus additional identifying surface data **ID** that represents a part **P2** of the real dental surface in proximity to part **DRM1**, and thus second part **RM2** at least partially overlaps with the physical part **RM1**. While scanning to provide the second virtual model **VM2**, it is now ensured that second virtual model **VM2** is free from distortions or imperfections that originate from the scanning procedure itself.

[0164] In step **460**, and referring also to Fig. **6**, the second 3D virtual model **VM2** is spatially registered with respect to the modified first 3D virtual model **VM1'** to provide a composite third 3D virtual model **VM3**, wherein the part **DVM1** that was previously deleted/removed is at least partially replaced with a corresponding part the second 3D virtual model **VM2**. In particular, the second virtual model **VM2** is manipulated in the computer system **32** to register the second virtual model **VM2** onto the modified first virtual model **VM1'**. In this connection, the identifying surface data **ID** of second virtual model **VM2** may be useful as it may be aligned with corresponding parts of the modified first virtual model **VM1'**, since the surface data for part **P2** of the real physical dental surface should be nominally identical in both scans. In this aligned position, part **DVM2** of the second virtual model **VM2** fits in and corresponds to at least a portion of the deleted portion **DVM1**, and part **DVM2** is then stitched to modified first virtual model **VM1'** in a virtual manner to create a further modified first virtual model, i.e., composite third 3D virtual model **VM3**. The remainder of the second virtual model **VM2**, including the identifying surface data **ID** may then be discarded.

[0165] Alternatively, it may not be necessary that second part **RM2** at least partially overlaps with the physical part **RM1**, and instead the 3D data defining each respective virtual model can be referred to the same global coordinate system in a different manner, for example via an optical marker whose 3D coordinates are known with respect to a global coordinate system, and which is scanned together with each one of second part **RM2** and physical part **RM1**.

[0166] Thus, the composite third 3D virtual model **VM3** replaces the undesired part **DVM1** of the original virtual model **VM1** with new 3D data provided by part **DVM2**.

[0167] It is readily evident that by carrying out steps **430** to **460**, the user only needs to "correct" or modify parts of the original virtual model **VM1** of the dental surface i.e. of physical part **RM1**, and does not need to obtain a new virtual model of the whole of physical part **RM1** from scratch, should even a small part of the virtual model **VM1** not be acceptable.

[0168] In alternative variations of this embodiment, steps **430** to **460** may be implemented in a different manner. For example, and referring to Fig. **9**, steps **430** to **460** may be replaced with steps **430'** to **460'** of modified method **400'**, which can include steps **410'**, **420'** and **470'** which are respectively identical to steps **410**, **420**, **470** of method **400** as disclosed herein, *mutatis mutandis*.

[0169] Step **430'** comprises all the elements and features of step **450** as disclosed herein, *mutatis mutandis*, with the main difference that step **430'** is implemented immediately following step **420'**. In other words, and having carried out steps **410'** and **420'**, the second virtual model **VM2** is created, representing a second part **RM2** of the physical dental structure. Again, the second virtual model **VM2** comprises a virtual part **DVM2** that represents the part **DRM1** of the physical dental surface, plus additional identifying surface data **ID** that represents a part **P2** of the real dental surface in proximity to part **DRM1**, and thus second part **RM2** at least partially overlaps with the physical part **RM1**. Before doing so, the part **DRM1** of the physical dental surface is cleaned up and/or unobstructed, and for example rescanned to obtain second virtual model **VM2**. The scanning procedure thus also includes scanning the additional part **P2** the real dental surface surrounding the part **DRM1** to obtain additional identifying 3D surface data **ID**.

[0170] Then, in step **440'**, second virtual model **VM2** is virtually registered with the first virtual model **VM1**. In particular, the second virtual model **VM2** is manipulated in the computer system **32** to register the second virtual model **VM2** onto the first virtual model **VM1**. In this connection, the identifying surface data **ID** of second virtual model **VM2** may be useful as it may be aligned with corresponding parts of the first virtual model **VM1**, since the surface data for part **P2** of the real physical dental surface should be nominally identical in both scans. In this aligned position, part **DVM2** of the second virtual model **VM2**, corresponds to, in particular spatially corresponds to, and is different from, in particular is topographically different from, at least a portion of the portion **DVM1** of the first virtual model **VM1** (as is the case also in steps **430** to **460** of method **400**, *mutatis mutandis*). At this point, portion **DVM1** has not yet been deleted, removed or identified.

[0171] In step **440'**, the second virtual model **VM2** is also displayed (and optionally magnified and/or manipulated) in display **33** as a second display image **DI2** corresponding to the second virtual model **VM2**, wherein display image **DI2** is similar to first display image **DI1** as disclosed herein, *mutatis mutandis*, but corresponds to the second virtual model **VM2** rather than the first virtual

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model **VM1**. For example when using a 2D display, the second display image **DI2** is also a two-dimensional image, but in 3D displays the second display image **DI2** can be a 3D image as well, or in 2D stereoscopic displays the second display image **DI2** can be a 2D stereoscopic image as well for example.

[0172] Both the second virtual model **VM2** and the first virtual model **VM1** are viewable on the display **33** via their respective images **DI2** and **DI1**, either together in registry, or may be selectively viewed separately, in different display windows on the same display **33**, for example, or alternately on the same display, or in different displays, and so on. To facilitate viewing the images in 3D registry, the images **DI2** and **DI1** may be visually encoded, each in a different manner. For example, the images **DI2** and **DI1** may be encoded each in a different color or shade of gray. Alternatively, at least parts of the images **DI2** and **DI1** which do not exactly correspond to one another may be color encoded in this manner to highlight the corresponding topographical differences between the real first part **RM1** and the real second part **RM2** of the physical dental structure.

[0173] In step **450'**, part **DVM1** of the first virtual model **VM1** is marked by the user on the first image of the first virtual model **VM1** on the display **33**, this part **DVM1** having first been visually identified by the user from the images **DI1** and **DI2** displayed in step **440'**. Thus, step **450'** is similar to step **430** as disclosed herein, *mutatis mutandis*, and thus by "marked" it is meant that the user may optionally interact with this area of the first image **DI1** in the display **33** so that a visual mark is included in the image to show and demarcate this area on the image **DI1** that is on the display **33**. For example, wand **34**, operatively connected to the computer system **32** can be used for interacting with the display **33**, wherein a visual mark is displayed wherever the tip **39** of the wand **34** touches the image **DI1** on the display **33**.

[0174] Step **460'** is similar to step **440** as disclosed herein, *mutatis mutandis*, and thus part **DVM1** of the first virtual model **VM1** is then "deleted" or otherwise removed or replaced interactively on the display **33** by the user, resulting in the first virtual model **VM1** being modified to become a modified first virtual model **VM1'**, for example by passing the tip of the wand **34** over the marked area of the image **DI1**, when a special "delete" function (also referred to interchangeably herein as a remove function, remove command, or deleted command, or replace function, or replace command) of the computer system **32** is activated, i.e., when a corresponding function (delete function or remove function or replace function) is applied to the marked area of the image **DI1**. Step **460'** in addition comprises part of step **460** as disclosed herein, *mutatis mutandis*, and, with the second 3D virtual model **VM2** already registered with respect to the modified first 3D virtual model **VM1** (step **440'**), the part **DVM1** that was previously deleted/removed is at least partially replaced with a

corresponding part of the second 3D virtual model **VM2**. Alternatively, this function operates as a unified replacement function in which **DVM1** is replaced in one operation with part **DVM2**.

[0175] In the aligned position of the registered modified first virtual model **VM1'** with second virtual model **VM2**, part **DVM2** of the second virtual model **VM2** virtually fits in and corresponds to at least a portion of the deleted portion **DVM1**, and part **DVM2** is then stitched to modified first virtual model **VM1'** in a virtual manner to create a further modified first virtual model, i.e., composite third 3D virtual model **VM3**. The remainder of the second virtual model **VM2**, including the identifying surface data **ID** may then be discarded.

[0176] Thus, in step **470'**, a composite third 3D virtual model **VM3** (comprising modified first virtual model **VM1'** part **DVM2**) effectively replaces the undesired part **DVM1** of the original virtual model **VM1** with new 3D data provided by part **DVM2**.

[0177] It is to be noted that at least in some alternative variations of the method **400'**, step **420'** and/or step **440'** can be omitted. For example, the user can scan the first physical part of the structure in step **410'** and then without displaying the respective first 3D virtual model, proceed with scanning the second part of the physical structure in step **430'** to provide the second 3D virtual model, also without displaying the respective second 3D virtual model. Thus, so long as the first 3D virtual model and the second 3D virtual model can be spatially registered (and thus the first physical part corresponds to (in particular spatially corresponds to) but may be different from (in particular topographically different from) the second physical part), step **460'** can be implemented automatically and the first 3D virtual model replaces parts thereof with the second 3D virtual model, without the need to have these parts or the first 3D virtual model or the second 3D virtual model displayed, identified or marked. Such a situation may arise, for example, where the user suspects or knows (for example during or after scanning to provide the first 3D virtual model) that some portions of the scanned first part of the physical structure were for example obscured, ill-defined, badly scanned, and so on and need to be rescanned. The user can then go back to these portions of the physical structure and rescan those portions to provide the second 3D virtual model which then automatically replaces corresponding parts of the first 3D virtual model.

[0178] In a similar manner, *mutatis mutandis*, in at least in some alternative variations of the method **400**, step **420** can be omitted, and steps **440** and **460** can be modified so that the interaction with the display is omitted, and the first 3D virtual model replaces parts thereof with the second 3D virtual model automatically via registration therewith, rather than implementing a delete function first, and a stitching function later.

[0179] Referring to Fig. 7, a second embodiment of the invention has all the elements, features and steps of the first embodiment including steps **410** to **470** or alternative variations thereof, for example steps **410'** to **470'**, *mutatis mutandis*, the main difference being that in the second embodiment the physical part **RM1** of the intra-oral cavity includes a removable physical artifact which may be temporarily obscuring part of the dental surfaces.

[0180] For example, the artifact may be a scanning body or impression abutment **600** (or any other structure) that is mounted onto a dental implant and projects into the intra oral cavity so that the spatial orientation and/or other characteristics of the implant **620** (which is already anchored in the jaw **630** and thus cannot be seen) with respect to the dental surfaces may be derived from the position/orientation of the artifact **600**.

[0181] The first virtual model **VM1** for this embodiment thus also includes a virtual representation of the artifact **600**, as well as all the other dental areas of interest of the physical part **RM1**, but the presence of the artifact **600** may render it difficult or impossible to obtain at the same time a full scan of the physical part **RM1**, as the artifact **600** may be too close in parts to the dental surfaces (e.g. adjacent teeth **640**, **650**) and thus obscures or blocks the ability of a scanner to scan such areas.

[0182] In this embodiment, and in applying method **400** to this embodiment, in steps **420** and **430**, each part of the virtual model corresponding to an obscured area (and possibly also corresponding to the artifact **600**) is deleted interactively in a similar manner that disclosed above for the first embodiment, *mutatis mutandis*, to provide the corresponding modified first virtual model **VM1'**.

[0183] Then, and prior to step **440**, the artifact **600**, which is considered the "first physical portion" in step **440**, is physically removed from the intraoral cavity and an area of the physical part **RM1** including the previously obscured areas that were not fully defined previously in the first virtual model **VM1** is scanned, in the absence of the artifact, enabling full definition of this area to be achieved in the corresponding second virtual model **VM2** thereby generated.

[0184] Thereafter, in step **460**, second virtual model **VM2** is registered with the modified first virtual model **VM1'**, in a manner similar to that disclosed above for the first embodiment, *mutatis mutandis*, to provide the corresponding the corresponding composite third virtual model **VM3**.

[0185] If necessary or desired, the artifact **600** itself (or part thereof) may also be scanned separately to obtain a virtual model thereof. This may be used to further modify the composite third virtual model, if for example part of the artifact was deleted in step **440**.

[0186] Method **400'** may be applied m a corresponding manner to the second embodiment, *mutatis mutandis*.

[0187] It is readily evident that by carrying out this embodiment of the invention, it allows obtaining a virtual model of the intra oral cavity including such an artifact, wherein even the parts of the dental surfaces obscured by the artifact can be fully defined with respect thereto, even when originally obscured by the artifact.

[0188] Referring to Fig. **8**, a third embodiment of the invention has all the elements, features and steps of the first embodiment including steps **410** to **470** or alternative variations thereof, for example steps **410'** to **470'**, *mutatis mutandis*, the main difference being that the physical part **RM1** in the third embodiment is considered to be well defined in the first virtual model **VM1**, i.e., faithfully represents the surfaces of interest of the physical part **RM1**; however, a first physical portion of the physical part **RM1** is not considered suitable for a dental procedure.

[0189] For example, the physical part **RM1** may be a dental preparation **700** for a dental prosthesis (e.g. a crown), and analysis of the first dental model with respect to a virtual model of the opposing dentition of the opposite jaw reveals that the form of the preparation would result in an inadequate structure for the prosthesis. For example, the dental preparation is too long and/or too thick, and would result in the thickness of the crown at the cusp being too thin, and thus mechanically weak.

[0190] In this connection, the distances between the preparation 700 and the opposed dental surfaces may be determined, for example, in a manner as disclosed in US 6,334,853, the contents of which are incorporated herein in their entirety, which in tum can provide a measure of the corresponding thickness of the respective dental prosthesis. In at least one embodiment disclosed in US 6,334,853, there is provided a method for obtaining a dental occlusion map of a three-dimensional virtual computer model of teeth of upper and lower jaws of a mouth, said occlusion map indicative of distances between opposite regions on facing surfaces of opposite teeth of the upper and lower jaws of the mouth, said method comprising the steps of:

(i) determining said distances between opposite regions on opposite teeth of the upper and lower jaws of the mouth; and

(ii) setting up a correspondence between said determined distances and regions on a mapping surface.

[0191] The part of the first 3D virtual model that corresponds to the unsuitable portion of the dental preparation **700** is then deleted or removed or replaced in steps **430** and **440** in applying method **400** to this embodiment, in a manner similar to that disclosed above for the first embodiment, *mutatis mutandis*.

[0192] The real dental preparation **700** is also physically modified by the dental practitioner in the areas found to be unsuitable for the prosthesis, for example via a material removal operation such as by using dental drills or dental lasers, for example, to provide a modified physical preparation **700'**.

[0193] Thereafter, in step **450**, a second virtual model **VM2** corresponding to the modified preparation **700'** is obtained, for example by scanning the newly worked area of the modified preparation **700'**, but also including additional part **750** of the preparation that was not altered in the material removal; process.

[0194] In step **460**, second virtual model **VM2** is registered with the modified first virtual model **VM1'**, in a manner similar to that disclosed above for the first embodiment, *mutatis mutandis*, to provide the corresponding the corresponding composite third virtual model **VM3**.

[0195] A new cycle of checking and modifying the preparation can be initiated if desired or necessary, wherein the third virtual model previously generated can be considered to be a "first virtual model" for the new cycle, and checked as in step **420**, *mutatis mutandis*, and if necessary, steps **430** to **460** repeated as often as required, each time providing a new third virtual model than can be considered, if desired as a new first virtual model, until the newly modified third virtual model has a geometry for the dental preparation (corresponding to the geometry of the real dental preparation) that is adequate for receiving a prosthesis, according to criteria.

[0196] It is also readily evident that rather than modifying the whole preparation, only part of the preparation, for example a part of the finish line, can be modified instead, and the method applied to this part only, saving considerable time by not having to scan the remainder of the preparation (that is considered acceptable) or surrounding areas, i.e., the whole physical part **RM1** again each time.

[0197] Method **400'** may be applied in a corresponding manner to the third embodiment, *mutatis mutandis*.

[0198] It is also readily evident that by carrying out this embodiment of the invention, it allows the dental practitioner to modify a dental structure such as dental preparation in a quick and easy manner with a minimum of scanning after the initial virtual scan. i.e., without the need to rescan the whole physical part **RM1** again each time.

[0199] It also readily evident that parts or all of the method steps according to each of the first, second and third embodiments and/or alternative variations thereof may be applied to one or more of the other embodiments as well.

[0200] It is also readily evident that the method (and corresponding system) according to each of the first, second and third embodiments and/or alternative variations thereof may further comprise a manufacturing step, in which a dental object may be manufactured based on the respective

composite third 3D virtual model **VM3** under computer aided manufacture (CAM). Such a dental object may be manufactured, for example, based on a material removal operation that is performed by a computer aided removal operation machine having a suitable machining tool, using any suitable CAM (Computer Aided Manufacturing) technology, typically a CNC milling machine, on a blank of material. This material is typically plaster or any other type of material commonly used for dental models, however any other suitable material may be used. Alternatively, other CAM-based techniques may be used, for example rapid prototyping or any other suitable 3D printing technique, for creating the dental object. Accordingly, a dental object corresponding to composite third 3D virtual model **VM3** or associated with the composite third 3D virtual model **VM3** can be manufactured.

[0201] For example, the dental object may comprise a physical model of the intraoral cavity, and thus composite third 3D virtual model **VM3** can be used directly to provide the necessary data for the CAM process.

[0202] In another example, and where the composite third 3D virtual model **VM3** is based on one or more teeth requiring a prosthesis, and thus comprise a suitable preparation. A dental object in the form of the respective prosthesis may be prepared based on information from the composite third 3D virtual model **VM3**. The dentist or a technician may generate a 3D virtual prosthesis model of a crown to be fitted on a tooth stump (or of a bridge to be fitted on the tooth surface, or of any other prosthesis to be fitted to the tooth/teeth including any restoration and/or any onlays, and/or any inlays, such as caps, for example, or veneering, or any other artificial partial or complete denture), to generate a digital file. Alternatively, the outer surface of the prosthesis may be designed manually if desired. The prosthesis may then be manufactured using any suitable CAM techniques, for example as disclosed above, *mutatis mutandis*, and in a further step, the prosthesis may be installed in the oral cavity of the patient. Optionally, the virtual prosthesis model may also include a virtual model of a coping plus a virtual model of a cap that is to be mounted onto the coping. The coping may be manufactured using any suitable method, for example as disclosed in WO 2004/087000, also assigned to the present Assignee, and the contents of which are incorporated herein in their entirety. The cap or full prosthesis may be manufactured using any suitable method, for example as disclosed in USSN 11/046,709 or in US Provisional Application No. 60/632,350, also assigned to the present Assignee, and the contents of which are incorporated herein in their entirety.

[0203] In another example, and where the composite third 3D virtual model VM3 is based on one or more teeth requiring an orthodontic treatment, a set of aligners may be manufactured based on the composite third 3D virtual model VM3. For example, the teeth shown in the 3D virtual model,

which normally would be of a patient's teeth in their initial positions, can be segmented (i.e. digitally cut into separate objects). The resultant digital data can then be used for orthodontic treatment planning. The individual teeth can be moved by a computer program and/or by an operator into a desired final setup. Then a number of digital intermediate tooth arrangements can be generated. These digital intermediate and final tooth arrangements of the treatment plan can be used to fabricate positive molds of intermediate arrangements (such as by using rapid proto typing equipment or milling machines) which are used to form aligners for moving teeth or they can be used to directly form aligners.

[0204] Alternatively, where the composite third 3D virtual model **VM3** is based on one or more teeth requiring an orthodontic treatment, dental objects in the form of a set of orthodontic appliances, for example brackets, may be virtually designed and/or manufactured (for example using suitable CAM-based techniques) based on the composite third 3D virtual model **VM3**.

[0205] Furthermore, where the composite third 3D virtual model **VM3** is based on one or more teeth requiring an orthodontic treatment, such an orthodontic treatment may be designed using a computer system based on third 3D virtual model **VM3**. For example such an orthodontic treatment may be provided by implementing a method for virtual orthodontic treatment, for example as disclosed in US 6,739,869, also assigned to the present Assignee, and the contents of which are incorporated herein in their entirety, and at least one embodiment of such a method for virtual orthodontic treatment comprises:

(a) providing a first virtual three-dimensional (3D) image indicative of a 3D model of all teeth of at least one jaw, the model being manipulable so as to allow its viewing from a desired direction - for example such a first virtual three-dimensional (3D) image may be based on the composite third 3D virtual model **VM3**;

(b) selecting a virtual set of orthodontic components, comprising (i) brackets, one for each tooth in said first image, for attachment to teeth of said image, each of said brackets having a slot for engaging an arch wire, and (ii) one or two arch wires, one for each jaw of said first image;

(c) associating the brackets with the teeth of said first image so as to obtain a second image of said virtual 3D model with the brackets associated with the teeth of the model, one bracket on each teeth in said model; and

(d) using a set of rules including a rule that requires each slot to engage the wire, computing the manner of movement of each tooth with the bracket associated therewith, so as to obtain a third image comprising the teeth model following the virtual treatment.

[0206] It is also readily evident that the method (and corresponding system) according to at least one embodiment of the present invention may be applied to obtaining a 3D virtual model of any physical structure, including non-dental structures, and in which it may be desired or necessary to re-scan a part of the structure, without the need to rescan the whole structure again to obtain an updated 3D virtual model of the physical structure. Such method (and corresponding system) may optionally be further used for manufacturing a physical object based on or associated with the updated 3D virtual model of the physical structure.

[0207] For example, the method (and corresponding system) according to at least one embodiment of the invention may be applied to scanning a complex circuit board comprising a plurality of chips mounted thereon, replacing one such ship and scanning the new chip in situ, and modifying the original 3D virtual model to replace the part thereof corresponding to the old chip with the 3D data corresponding to the new chip.

[0208] In another example, the method (and corresponding system) according to at least one embodiment of the invention may be applied to scanning a complex geometrical physical structure comprising a plurality of geometrical entities mounted or formed thereon, adding or removing a geometrical physical entity with respect to the structure, and scanning the modified physical structure in the area that includes the new geometrical entity or that includes the modification of the physical structure arising from the removal of the geometrical entity, respectively, and modifying the original 3D virtual model to replace a corresponding part thereof with the 3D data corresponding to the aforesaid scanned area.

[0209] In the method claims that follow, alphanumeric characters and Roman numerals used to designate claim steps are provided for convenience only and do not imply any particular order of performing the steps.

[0210] Finally, it should be noted that the word "comprising" as used throughout the appended claims is to be interpreted to mean "including but not limited to".

[0211] While there has been shown and disclosed some embodiments in accordance with the invention, it will be appreciated that many changes may be made therein without departing from the spirit of the invention.

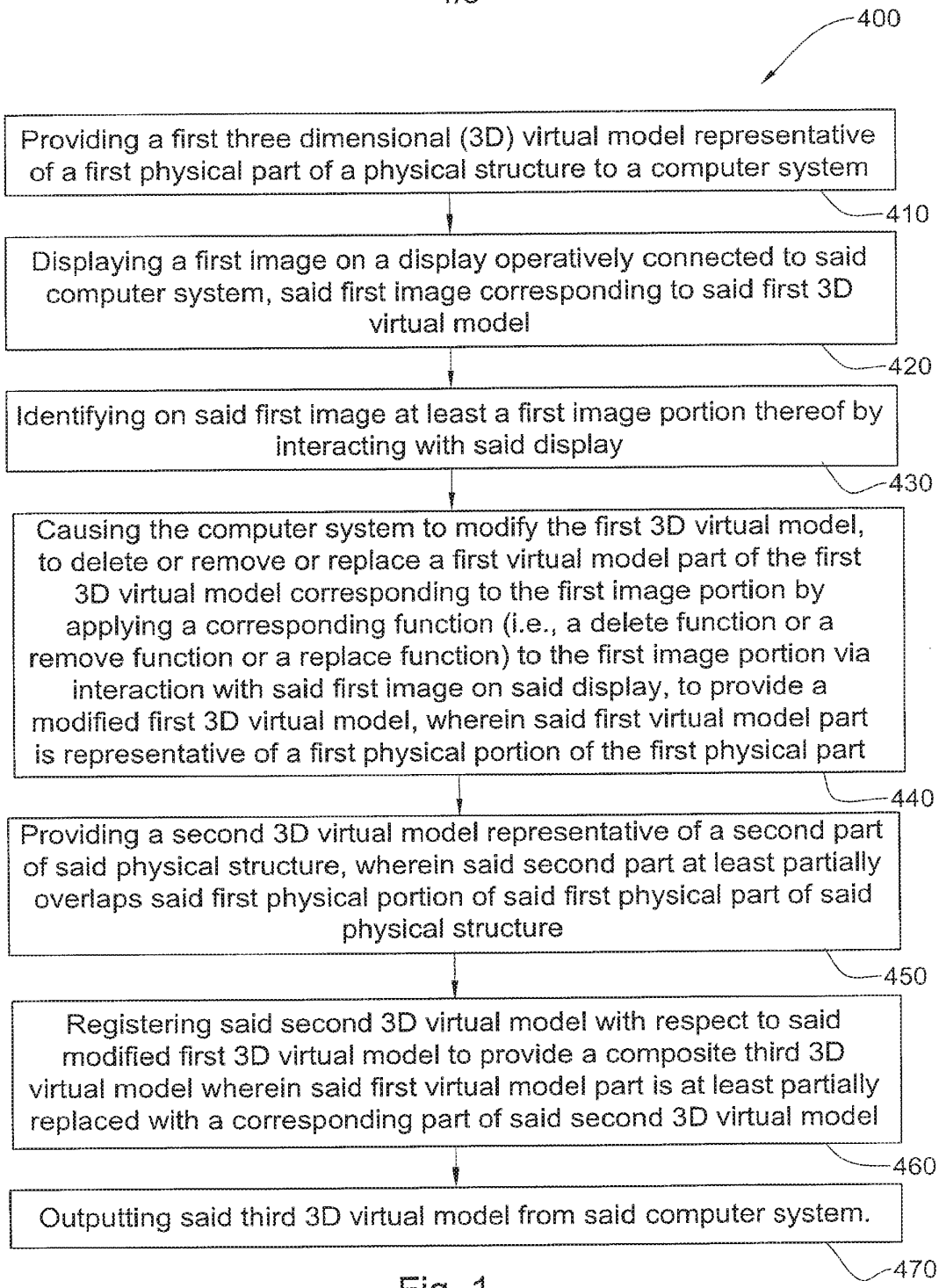

400
Providing a first three dimensional (3D) virtual model representative of a first physical part of a physical structure to a computer system
410
Displaying a first image on a display operatively connected to said computer system, said first image corresponding to said first 3D virtual model
420
Identifying on said first image at least a first image portion thereof by interacting with said display
430
Causing the computer system to modify the first 3D virtual model, to delete or remove or replace a first virtual model part of the first 3D virtual model corresponding to the first image portion by applying a corresponding function (i.e., a delete function or a remove function or a replace function) to the first image portion via interaction with said first image on said display, to provide a modified first 3D virtual model, wherein said first virtual model part is representative of a first physical portion of the first physical part
440
Providing a second 3D virtual model representative of a second part of said physical structure, wherein said second part at least partially overlaps said first physical portion of said first physical part of said physical structure
450
Registering said second 3D virtual model with respect to said modified first 3D virtual model to provide a composite third 3D virtual model wherein said first virtual model part is at least partially replaced with a corresponding part of said second 3D virtual model
460
Outputting said third 3D virtual model from said computer system.
470

Fig. 1

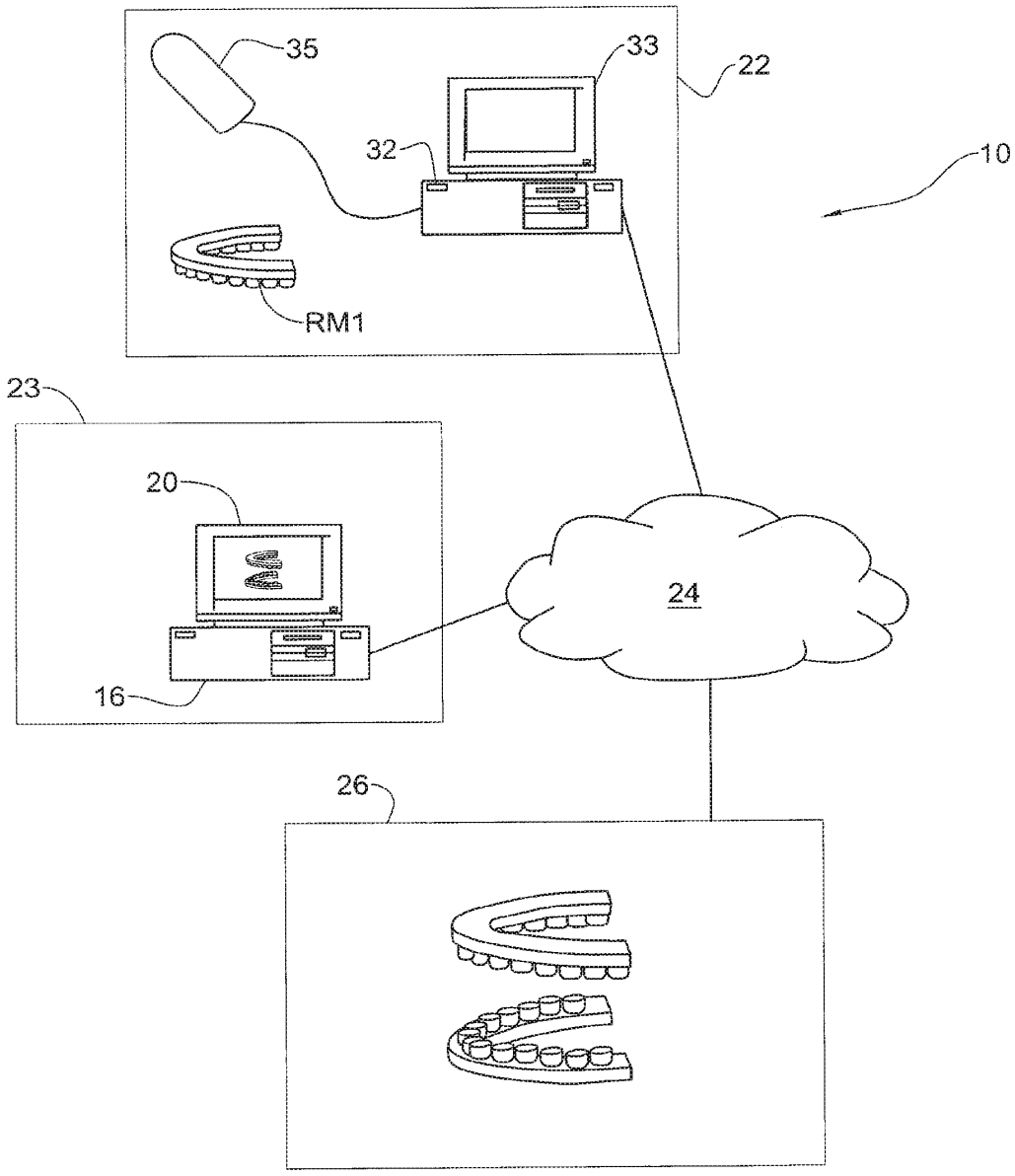


Fig. 2

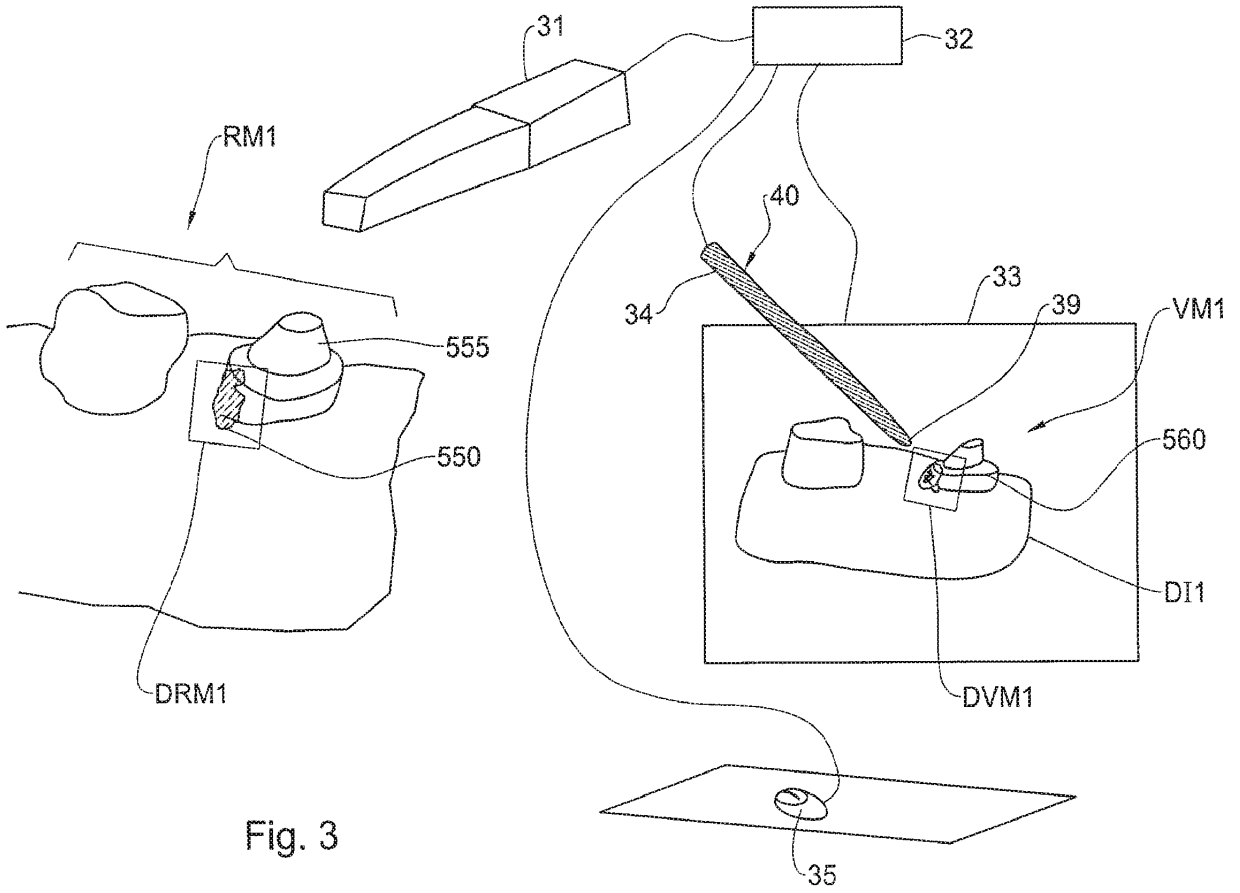


Fig. 3

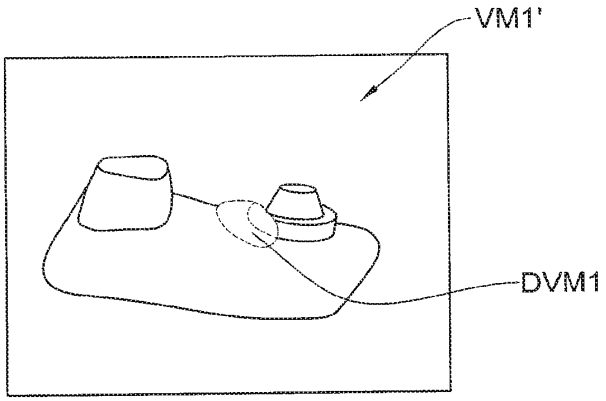


Fig. 4

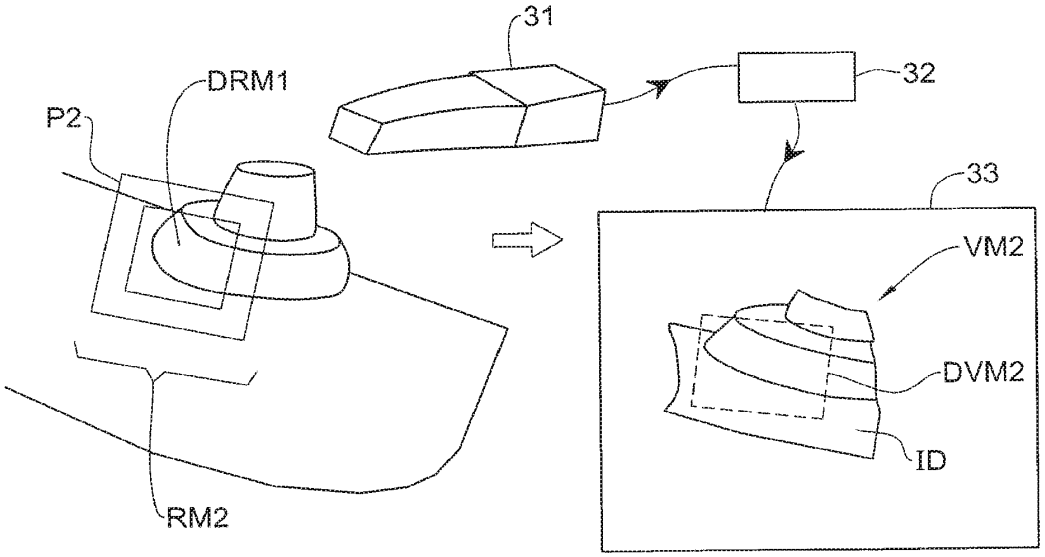


Fig. 5

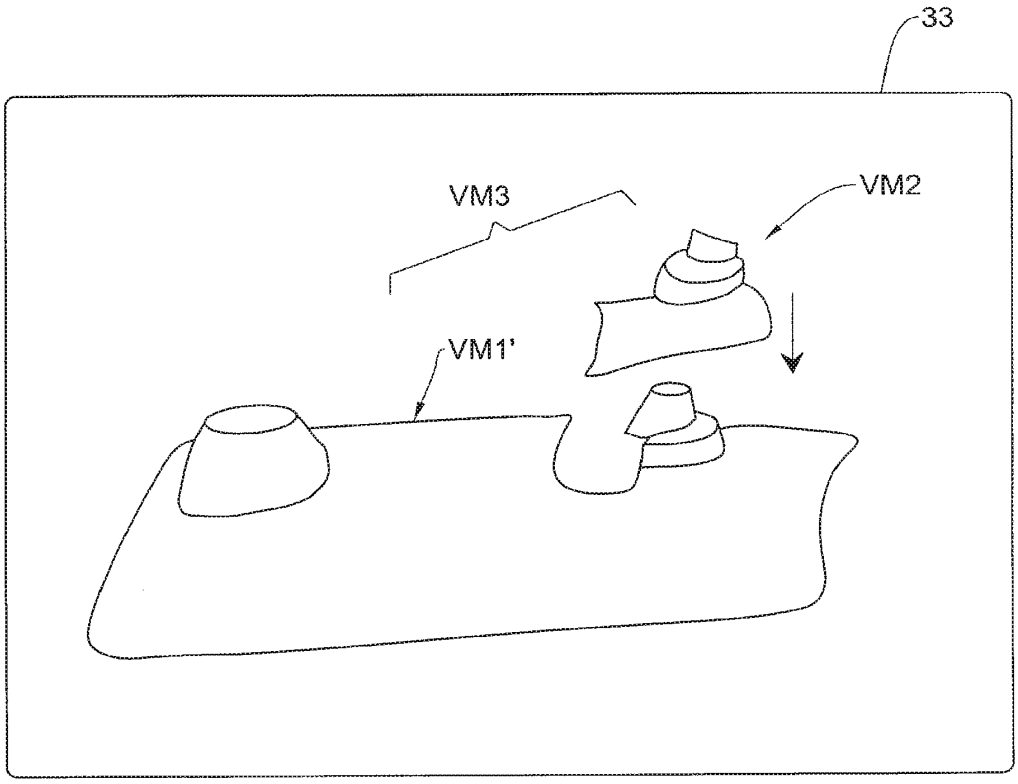


Fig. 6

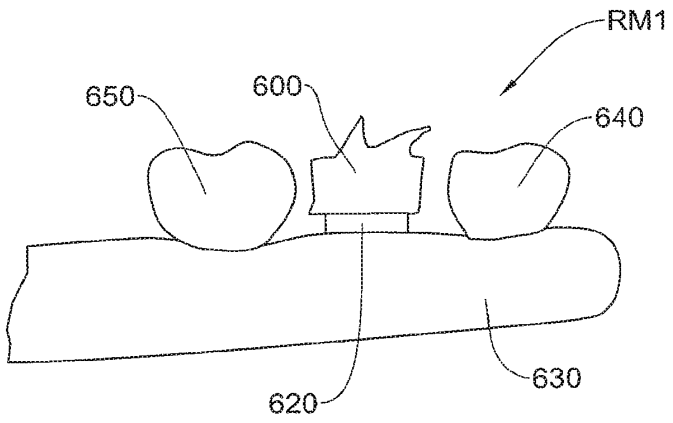


Fig. 7

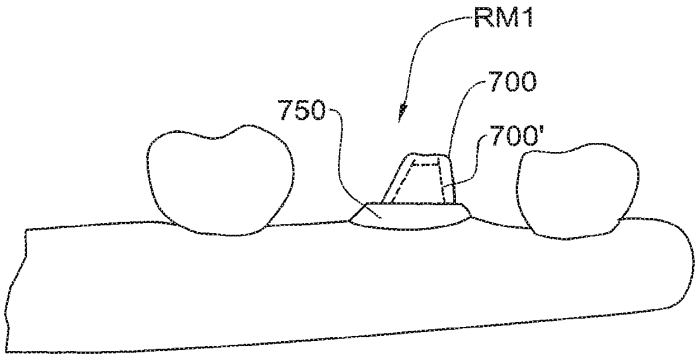


Fig. 8

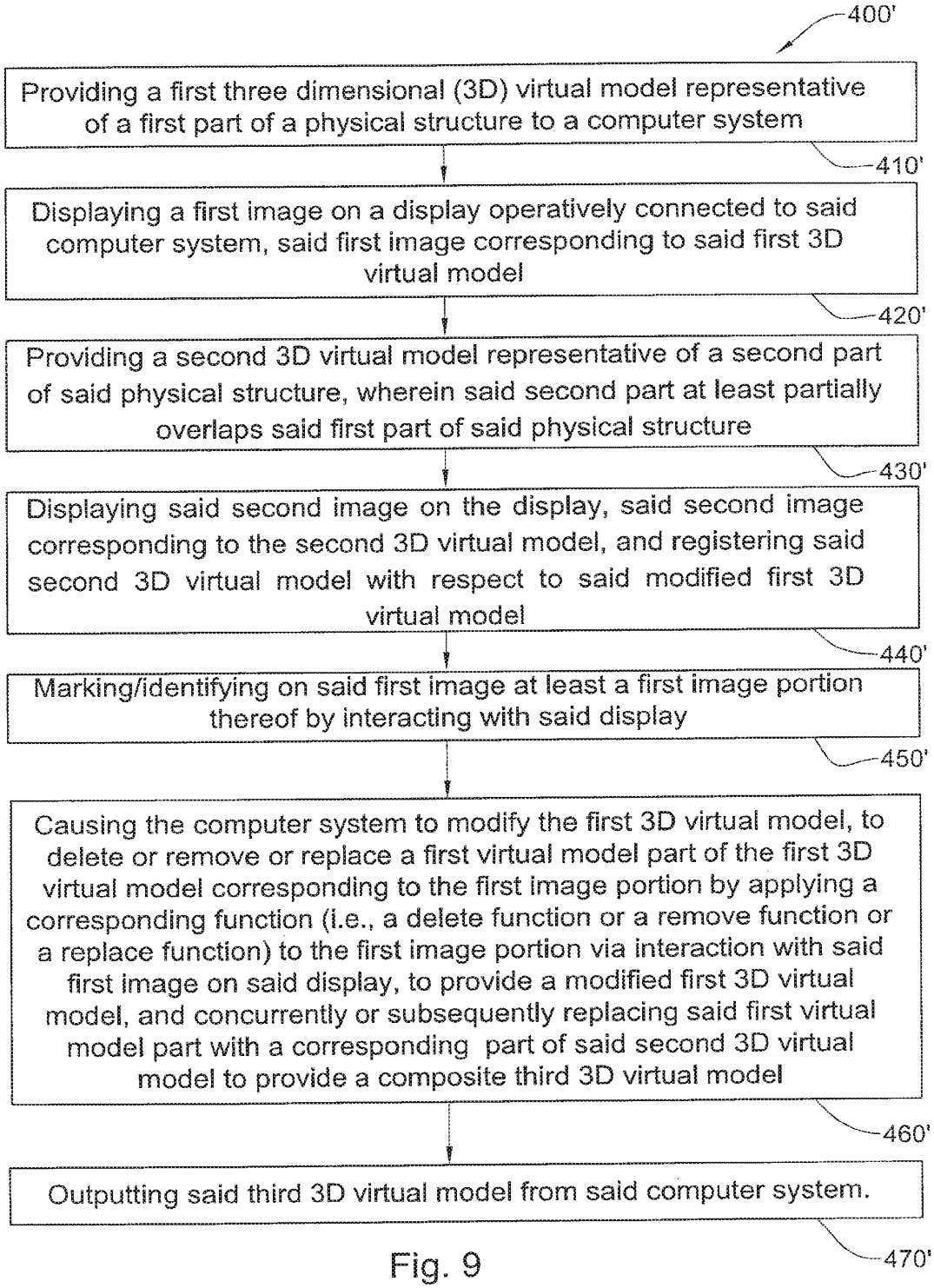

400'
Providing a first three dimensional (3D) virtual model representative of a first part of a physical structure to a computer system
410'
Displaying a first image on a display operatively connected to said computer system, said first image corresponding to said first 3D virtual model
420'
Providing a second 3D virtual model representative of a second part of said physical structure, wherein said second part at least partially overlaps said first part of said physical structure
430'
Displaying said second image on the display, said second image corresponding to the second 3D virtual model, and registering said second 3D virtual model with respect to said modified first 3D virtual model
440'
Marking/identifying on said first image at least a first image portion thereof by interacting with said display
450'
Causing the computer system to modify the first 3D virtual model, to delete or remove or replace a first virtual model part of the first 3D virtual model corresponding to the first image portion by applying a corresponding function (i.e., a delete function or a remove function or a replace function) to the first image portion via interaction with said first image on said display, to provide a modified first 3D virtual model, and concurrently or subsequently replacing said first virtual model part with a corresponding part of said second 3D virtual model to provide a composite third 3D virtual model
460'
Outputting said third 3D virtual model from said computer system.
470'

Fig. 9

PTO/SB/17 (01-18)
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FEE TRANSMITTAL

	Complete if known	
	Application Number	
	Filing Date	concurrently herewith
☐ Applicant asserts small entity status. See 37 CFR 1.27.	First Named Inventor	Avi Kopelman
☐ Applicant certifies micro entity status. See 37 CFR 1.29. Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.	Examiner Name	
	Art Unit	
TOTAL AMOUNT OF PAYMENT ($) 5,860	Practitioner Docket No.	22773-822.303

METHOD OF PAYMENT (check all that apply)

☐ Check ☐ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): _____

☒ Deposit Account Deposit Account Number: 23-2415 Deposit Account Name: Wilson Sonsini Goodrich & Rosati

For the above-identified deposit account, the Director is hereby authorized to (check all that apply):

☒ Charge fee(s) indicated below ☐ Charge fee(s) indicated below, **except for the filing fee**

☒ Charge any additional fee(s) or underpayment of fee(s) under 37 CFR 1.16 and 1.17 ☒ Credit any overpayment of fee(s)

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FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES (U = undiscounted fee; S = small entity fee; M = micro entity fee)

	FILING FEES			SEARCH FEES			EXAMINATION FEES			
Application Type	**U ($)**	**S ($)**	**M ($)**	**U ($)**	**S ($)**	**M ($)**	**U ($)**	**S ($)**	**M ($)**	**Fees Paid ($)**
Utility	300	150*	75	660	330	165	760	380	190	1,720
Design	200	100	50	160	80	40	600	300	150	
Plant	200	100	50	420	210	105	620	310	155	
Reissue	300	150	75	660	330	165	2,200	1,100	550	
Provisional	280	140	70	0	0	0	0	0	0	

* The $150 small entity status filing fee for a utility application is further reduced to $75 for a small entity status applicant who files the application via EFS-Web.

2. EXCESS CLAIM FEES

Fee Description	**Undiscounted Fee ($)**	**Small Entity Fee ($)**	**Micro Entity Fee ($)**
Each claim over 20 (including Reissues)	100	50	25
Each independent claim over 3 (including Reissues)	460	230	115
Multiple dependent claims	820	410	205

Total Claims		**Extra Claims**		**Fee ($)**		**Fee Paid ($)**
20	-20 or HP =	0	x		=	0

HP = highest number of total claims paid for, if greater than 20.

Indep. Claims		**Extra Claims**		**Fee ($)**		**Fee Paid ($)**
3	-3 or HP =	0	x		=	0

HP = highest number of independent claims paid for, if greater than 3.

Multiple Dependent Claims	**Fee ($)**	**Fee Paid ($)**

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is $400 ($200 for small entity) ($100 for micro entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets		**Extra Sheets**		**Number of each additional 50 or fraction thereof**		**Fee ($)**		**Fee Paid ($)**
	- 100 =		/ 50 =		(round **up** to a whole number) x		=	

4. OTHER FEE(S) **Fees Paid ($)**

Non-English specification, $130 fee (no small or micro entity discount) _____

Non-electronic filing fee under 37 CFR 1.16(t) for a utility application, $400 fee ($200 small or micro entity) _____

Other (e.g., late filing surcharge): Processing Fee ($140); Request for prioritized examination ($4,000) $4140

SUBMITTED BY

Signature	/Charles Hagadorn, III/	Registration No. (Attorney/Agent) 62,367	Telephone 206-883-2500
Name (Print/Type)	Charles Hagadorn, III		Date September 27, 2019

This collection of information is required by 37 CFR 1.136. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal	
Application Number:	
Filing Date:	
Title of Invention:	METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS
First Named Inventor/Applicant Name:	Avi Kopelman
Filer:	Charles C. Hagadorn III/Hillary Pratt
Attorney Docket Number:	22773-822.303
Filed as Large Entity	
Filing Fees for Track I Prioritized Examination - Nonprovisional Application under 35 USC 111(a)	

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
UTILITY APPLICATION FILING	1011	1	300	300
UTILITY SEARCH FEE	1111	1	660	660
UTILITY EXAMINATION FEE	1311	1	760	760
REQUEST FOR PRIORITIZED EXAMINATION	1817	1	4000	4000
Pages:				
Claims:				
Miscellaneous-Filing:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
PUBL. FEE- EARLY, VOLUNTARY, OR NORMAL	1504	1	0	0
PROCESSING FEE, EXCEPT PROV. APPLS.	1830	1	140	140
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**5860**

Electronic Acknowledgement Receipt	
EFS ID:	37307404
Application Number:	16586528
International Application Number:	
Confirmation Number:	9600
Title of Invention:	METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS
First Named Inventor/Applicant Name:	Avi Kopelman
Customer Number:	107046
Filer:	Charles C. Hagadorn III/Hillary Pratt
Filer Authorized By:	Charles C. Hagadorn III
Attorney Docket Number:	22773-822.303
Receipt Date:	27-SEP-2019
Filing Date:	
Time Stamp:	18:08:40
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$5860
RAM confirmation Number	E20199QI09268948
Deposit Account	232415
Authorized User	Hillary Pratt
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	22773_822_303_ADS.pdf	1823421 26834502a7baee880fd1a1a32fc7d40f8a6b407c	no	8
Warnings:					
Information:					
2	Oath or Declaration filed	22773_822_303_Dec.pdf	168771 b096fb5b8da0b9b75bf919a23b07d52e5d71a04f	no	1
Warnings:					
Information:					
3	Power of Attorney	22773_822_303_POA.pdf	871342 24d7e1511fcc26e15e4fa62de3f3560e3db927d3	no	1
Warnings:					
Information:					
4	Power of Attorney	22773_822_303_StatementUnder373c.pdf	121395 279bb6d497aa44ad1eaf59edb4c4015b7ce50637	no	3
Warnings:					
Information:					
5	TrackOne Request	22773_822_303_TrackOneRequest.pdf	114247 73cf526f268a84de9d177ba4e7f60e3bc743de55	no	2
Warnings:					
Information:					
6	Transmittal of New Application	22773_822_303_Transmittal.pdf	278142 020f33fd94692e63ce6ef525eeea16bb96549169	no	2
Warnings:					
Information:					

7		22773_822_303_Application_Final.pdf	353072 3f673877e4a84b6897dfdb75685e8455c4eab152	yes	45
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Abstract		45	45	
	Claims		40	44	
	Specification		1	39	
Warnings:					
Information:					
8	Drawings-only black and white line drawings	22773_822_303_Drawings.pdf	637944 c825cdf06e00130924a80851616377d2cf65fdc4	no	8
Warnings:					
Information:					
9	Fee Worksheet (SB06)	22773_822_303_FeeTransmittal.pdf	209757 6bba7fb01b9e45a2e11a004db4d434614159a3512	no	2
Warnings:					
Information:					
10	Fee Worksheet (SB06)	fee-info.pdf	40228 4462c36e4643a5c5014c750945fa38b9872d8a41	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	4618319		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/AIA/14 (11-15)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	22773-822.303
	Application Number	
Title of Invention	METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

☐ Portions or **all** of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 — Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Avi		Kopelman	

Residence Information (Select One) ● US Residency Non US Residency Active US Military Service

City	Palo Alto	State/Province	CA	Country of Residence	US

Mailing Address of Inventor:

Address 1	776 Josina Avenue		
Address 2			
City	Palo Alto	**State/Province**	CA
Postal Code	94306	**Country**	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. — Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	107046		
Email Address	patentdocket@wsgr.com	Add Email	Remove Email

Application Information:

Title of the Invention	METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS		
Attorney Docket Number	22773-822.303	**Small Entity Status Claimed**	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	8	**Suggested Figure for Publication (if any)**	

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	22773-822.303
	Application Number	
Title of Invention	METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	● Customer Number	US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	107046		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Continuation of	15050673	2016-02-23

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	22773-822.303
	Application Number	
Title of Invention	METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS	

Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
15050673	Continuation of	13574723	2013-01-04	9299192	2016-03-29
Prior Application Status	Expired				Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
13574723	a 371 of international	PCT/IL11/00574	2011-07-19		
Prior Application Status	Expired				Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
PCT/IL11/00574	Claims benefit of provisional	61365556	2010-07-19		
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.					Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

			Remove
Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.			Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	22773-822.303
	Application Number	
Title of Invention	METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	22773-822.303
	Application Number	
Title of Invention	METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS	

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1 — Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

● Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
Person to whom the inventor is obligated to assign.	Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	Align Technology, Inc.		
Mailing Address Information For Applicant:			
Address 1	2820 Orchard Parkway		
Address 2			
City	San Jose	**State/Province**	CA
Country	US	Postal Code	95134
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

PTO/AIA/14 (11-15)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	22773-822.303
	Application Number	
Title of Invention	METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS	

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add

Signature:

Remove

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Charles Hagadorn, III/			Date (YYYY-MM-DD)	2019-09-27
First Name	Charles	Last Name	Hagadorn, III	Registration Number	62,367

Additional Signature may be generated within this form by selecting the Add button. Add

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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	22773-822.303
	Application Number	
Title of Invention	METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1 The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3 A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent CooperationTreaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	METHODS AND SYSTEMS FOR CREATING AND INTERACTING WITH THREE DIMENSIONAL VIRTUAL MODELS

As the below named inventor, I hereby declare that:

This declaration is directed to:

☐ The attached application, or

☒ United States application or PCT international application number 15/050,673 filed on February 23, 2016.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Avi Kopelman Date (Optional) :

Signature: Avi Kopelman

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Align Technology, Inc.

Application No./Patent No.: Herewith Filed/Issue Date: Herewith

Titled: METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS

Align Technology, Inc., a corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

B. ☑ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: AVI KOPELMAN To: ALIGN TECHNOLOGY, INC.

   The document was recorded in the United States Patent and Trademark Office at
   Reel 028827, Frame 0892, or for which a copy thereof is attached.

2. From: ALIGN TECHNOLOGY, INC. To: CADENT LTD.

   The document was recorded in the United States Patent and Trademark Office at
   Reel 029232, Frame 0709, or for which a copy thereof is attached.

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: CADENT LTD. To: ALIGN TECHNOLOGY, INC.

The document was recorded in the United States Patent and Trademark Office at
Reel 034545, Frame 0470, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☑ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Charles Hagadorn, III/	September 27, 2019
Signature	Date
Charles Hagadorn, III	62,367
Printed or Typed Name	Title or Registration Number

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Doc Code: TRACK1.REQ
Document Description: TrackOne Request

PTO/AIA/424 (04-14)

CERTIFICATION AND REQUEST FOR PRIORITIZED EXAMINATION UNDER 37 CFR 1.102(e) (Page 1 of 1)

First Named Inventor:	Avi Kopelman	Nonprovisional Application Number (if known):	
Title of Invention:	METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS		

APPLICANT HEREBY CERTIFIES THE FOLLOWING AND REQUESTS PRIORITIZED EXAMINATION FOR THE ABOVE-IDENTIFIED APPLICATION.

1. The processing fee set forth in 37 CFR 1.17(i)(1) and the prioritized examination fee set forth in 37 CFR 1.17(c) have been filed with the request. The publication fee requirement is met because that fee, set forth in 37 CFR 1.18(d), is currently $0. The basic filing fee, search fee, and examination fee are filed with the request or have been already been paid. I understand that any required excess claims fees or application size fee must be paid for the application.

2. I understand that the application may not contain, or be amended to contain, more than four independent claims, more than thirty total claims, or any multiple dependent claims, and that any request for an extension of time will cause an outstanding Track I request to be dismissed.

3. The applicable box is checked below:

I. ☑ Original Application (Track One) - Prioritized Examination under § 1.102(e)(1)

i. (a) The application is an original nonprovisional utility application filed under 35 U.S.C. 111(a). This certification and request is being filed with the utility application via EFS-Web.

---OR---

(b) The application is an original nonprovisional plant application filed under 35 U.S.C. 111(a). This certification and request is being filed with the plant application in paper.

ii. An executed inventor's oath or declaration under 37 CFR 1.63 or 37 CFR 1.64 for each inventor, **or** the application data sheet meeting the conditions specified in 37 CFR 1.53(f)(3)(i) is filed with the application.

II. ☐ Request for Continued Examination - Prioritized Examination under § 1.102(e)(2)

i. A request for continued examination has been filed with, or prior to, this form.
ii. If the application is a utility application, this certification and request is being filed via EFS-Web.
iii. The application is an original nonprovisional utility application filed under 35 U.S.C. 111(a), or is a national stage entry under 35 U.S.C. 371.
iv. This certification and request is being filed prior to the mailing of a first Office action responsive to the request for continued examination.
v. No prior request for continued examination has been granted prioritized examination status under 37 CFR 1.102(e)(2).

Signature /Charles Hagadorn, III/	Date September 27, 2019
Name (Print/Typed) Charles Hagadorn, III	Practitioner Registration Number 62367

Note: *This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. Submit multiple forms if more than one signature is required.**

☑ *Total of 1 forms are submitted.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/AIA/80 (07-17)
Approved for use through 03/31/2018. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no person is required to respond to a collection of information unless it displays a valid OMB control number

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

[X] Practitioners associated with Customer Number: 107046

OR

[ ] Practitioner(s) named below (If more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

[X] The address associated with Customer Number: 107046

OR

[ ]

Firm or individual name		
Address		
City	State	Zip
Country		
Telephone	Email	

Assignee name and address: Align Technology, Inc.
2820 Orchard Parkway
San Jose, California 95134

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of the practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee.

Signature	Date September 13, 2017
Name Arthur Hsieh	Telephone 408-470-1000
Title VP, Associate General Counsel, Intellectual Property & Licensing	

This collection of information is required by 37 CFR 1.31, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public, which is to update (and by the USPTO to process) the file of a patent or reexamination proceeding. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 18 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
16/586,528	09/27/2019		1720	22773-822.303	20	3

CONFIRMATION NO. 9600

107046
WSGR / Align Technology , Inc.
650 Page Mill Road
Palo Alto, CA 94304

FILING RECEIPT



Date Mailed: 10/15/2019

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

Avi Kopelman, Palo Alto, CA;

Applicant(s)

Align Technology, Inc., San Jose, CA;

Power of Attorney: The patent practitioners associated with Customer Number 107046

Domestic Priority data as claimed by applicant

This application is a CON of 15/050,673 02/23/2016
which is a CON of 13/574,723 01/04/2013 PAT 9299192
which is a 371 of PCT/IL11/00574 07/19/2011
which claims benefit of 61/365,556 07/19/2010

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 10/10/2019
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/586,528**
Projected Publication Date: 01/23/2020
Non-Publication Request: No
Early Publication Request: No
Title

METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS

Preliminary Class

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 16/586,528

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	300
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	660
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	760
TOTAL CLAIMS (37 CFR 1.16(i))	20 minus 20 =	*			OR	x 100 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*				x 460 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	1720

APPLICATION AS AMENDED - PART II

AMENDMENT A

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
Application Size Fee (37 CFR 1.16(s))									
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

AMENDMENT B

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)		RATE($)	ADDITIONAL FEE($)
Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
Application Size Fee (37 CFR 1.16(s))									
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/586,528	09/27/2019	Avi Kopelman	22773-822.303	9600

107046 7590 10/22/2019
WSGR / Align Technology , Inc.
650 Page Mill Road
Palo Alto, CA 94304

EXAMINER	

ART UNIT	PAPER NUMBER
2128	

NOTIFICATION DATE	DELIVERY MODE
10/22/2019	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentdocket@wsgr.com

PTOL-90A (Rev. 04/07)

Decision Granting Request for Prioritized Examination (Track I)	**Application No.** 16/586,528	**Applicant(s)** Kopelman, Avi	
	Examiner BRIAN W BROWN	**Art Unit** OPET	**AIA (FITF) Status** No

1. THE REQUEST FILED 27 September 2019 IS **GRANTED** .

The above-identified application has met the requirements for prioritized examination

A. ☑ for an original nonprovisional application (Track I).
B. ☐ for an application undergoing continued examination (RCE).

2. **The above-identified application will undergo prioritized examination**. The application will be accorded special status throughout its entire course of prosecution until one of the following occurs:

A. filing a **petition for extension of time** to extend the time period for filing a reply;

B. filing an **amendment to amend the application to contain more than four independent claims, more than thirty total claims** , or a multiple dependent claim;

C. filing a **request for continued examination** ;

D. filing a notice of appeal;

E. filing a request for suspension of action;

F. mailing of a notice of allowance;

G. mailing of a final Office action;

H. completion of examination as defined in 37 CFR 41.102; or

I. abandonment of the application.

Telephone inquiries with regard to this decision should be directed to BRIAN BROWN at (571)272-5338.

In his/her absence, calls may be directed to Petition Help Desk at (571) 272-3282.

/BRIAN W BROWN/ Petitions Examiner, OPET	

UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/586,528	09/27/2019	Avi Kopelman	22773-822.303

CONFIRMATION NO. 9600

107046
WSGR / Align Technology , Inc.
650 Page Mill Road
Palo Alto, CA 94304

PUBLICATION NOTICE

OC000000114144546

Title:METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS

Publication No.US-2020-0022584-A1
Publication Date:01/23/2020

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Public Records Division. The Public Records Division can be reached by telephone at (571) 272-3150 or (800) 972-6382, by facsimile at (571) 273-3250, by mail addressed to the United States Patent and Trademark Office, Public Records Division, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently https://portal.uspto.gov/pair/PublicPair. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/586,528	09/27/2019	Avi Kopelman	22773-822.303	9600

107046 7590 02/21/2020

WSGR / Align Technology , Inc.
650 Page Mill Road
Palo Alto, CA 94304

EXAMINER	
MAPAR, BIJAN	

ART UNIT	PAPER NUMBER
2128	

NOTIFICATION DATE	DELIVERY MODE
02/21/2020	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentdocket@wsgr.com

Office Action Summary	**Application No.** 16/586,528	**Applicant(s)** Kopelman, Avi	
	Examiner BIJAN MAPAR	**Art Unit** 2128	**AIA (FITF) Status** No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 9/27/2019.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-20 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1-20 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☑ The drawing(s) filed on 9/27/2019 is/are: a)☑ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

The present application is being examined under the pre-AIA first to invent provisions.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on nonstatutory double patenting provided the reference application or patent either is shown to be commonly owned with the examined application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. See MPEP § 717.02 for applications subject to examination under the first inventor to file provisions of the AIA as explained in MPEP § 2159. See MPEP §§ 706.02(l)(1) - 706.02(l)(3) for applications not subject to examination under the first inventor to file provisions of the AIA. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO Internet website contains terminal disclaimer forms which may be used. Please visit www.uspto.gov/patent/patents-forms. The filing date of the application in which the form is filed determines what form (e.g., PTO/SB/25, PTO/SB/26, PTO/AIA/25, or PTO/AIA/26) should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more information about eTerminal Disclaimers, refer to www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp.

Claims 1-20 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-8 and 23-30 of copending Application No. 16/176,474 (reference application). Although the claims at issue are not identical, they are not patentably distinct from each other because the features recited are equivalent in the following manner:

Instant Claim 1 (16/586,528)	**Reference Claim 1 (16/176,474)**
A system for scanning a patient's teeth for a dental procedure, the system comprising:	A dental system for intraorally scanning a patient's teeth for a dental procedure, the dental system comprising:
a hand-held intraoral scanner; and	a hand-held intraoral scanner; and
a computer readable medium including instructions that when executed by a computer system, causes the computer system to:	a computer readable medium including instructions that when executed by a computer system, causes cause the computer system to:
receive first scan data of the patient's teeth from the hand-held intraoral scanner;	receive first 3D intraoral scan data of the patient's teeth from the hand-held intraoral scanner;

display, to a display, a model of the patient's teeth, wherein the model of the patient's teeth is based on the received first scan data of the patient's teeth;	display, to a display, a first 3D surface model of the patient's teeth, wherein the first 3D surface model of the patient's teeth is based on the received first 3D intraoral scan data of the patient's teeth;
receive user input defining a portion of the model to be removed;	receive user input defining a surface portion of the first 3D surface model to beremoved;
remove, from the displayed model, the surface portion of the model to be removed according to the user input;	after receiving the user input, remove, from the displayed first 3D surface model, the surface portion of the first 3D surface model to be removed according to the user input;
receive second scan data of the patient's teeth from the hand-held intraoral scanner, the second scan data including surface data of a physically changed portion of the patient's intra-oral cavity;	after removing the surface portion of the first 3D surface model, receive second 3D intraoral scan data of the patient's teeth from the hand-held intraoral scanner, the second 3D intraoral scan data including surface data of a physically changed portion of the patient's intraoral cavity;
replace at least a portion of the removed portion of the model using the received second scan data of the patient's teeth including surface data of a physically changed portion of the patient's intraoral cavity; and	replace at least a portion of the removed surface portion of the first 3D surface model with at least a surface portion of a second 3D surface model including the physically changed portion based on the received second 3D intraoral scan

	data of the patient's teeth to produce a composite 3D surface model of the patient's teeth that is based on the first 3D intraoral scan data and the second 3D intraoral scan data; and
output, to the display, the model of the patient's teeth with the portion of the removed portion replaced using the received second scan data.	output, to the display, the composite 3D surface model of the patient's teeth.

Dependent claims 2-8 are equivalent to reference claims 2-8, in the same ordering.

Instant Claim 9 (16/586,528)	**Reference Claim 23 (16/176,474)**
A method for scanning a patient's teeth for a dental procedure, the method comprising:	A dental method for intraorally scanning a patient's teeth for a dental procedure, the dental method comprising:
receiving first scan data of the patient's teeth from a hand-held intraoral scanner;	receiving first 3D intraoral scan data of the patient's teeth from a hand-held intraoral scanner;
displaying, to a display, a model of the patient's teeth, wherein the model of the patient's teeth is based on the received first scan data of the patient's teeth;	displaying, to a display, a first 3D surface model of the patient's teeth, wherein the first 3D surface model of the patient's teeth is based on

	the received first 3D intraoral scan data of the patient's teeth;
receiving user input via the displayed model demarcating a portion of the model to be retained and a surface portion of the model to be replaced;	receiving user input via the displayed first 3D surface model demarcating a surface portion of the first 3D surface model to be retained and a surface portion of the first 3D surface model to be replaced;
receiving second scan data of the patient's teeth from the hand-held intraoral scanner, the second scan data including surface data of a physically changed portion of the patient's intra-oral cavity;	after receiving the user input, receiving second 3D intraoral scan data of the patient's teeth from the hand-held intraoral scanner, the second 3D intraoral scan data including surface data of a physically changed portion of the patient's intra-oral cavity;
replacing at least a portion of the portion of the model to be replaced according to the user input using at least a portion of the received second scan data of the patient's teeth including the physically changed portion; and	replacing at least a portion of the surface portion of the first 3D surface model to be replaced according to the user input with at least a surface portion of a second 3D surface model based on the received second 3D intraoral scan data of the patient's teeth including the physically changed portion to produce a composite 3D surface model of the patient's teeth that is based on the first 3D intraoral scan data and the second 3D intraoral scan data; and

outputting, to the display, the model of the patient's teeth with the portion of the removed portion replaced using the received second scan data.	output, to the display, the composite 3D surface model of the patient's teeth.

Dependent claims 10-16 are equivalent to reference claims 24-30, in the same ordering.

Instant Claim 9 (16/586,528)	**Reference Claim 7, including the limitations inherited from claims 4 and 1 (16/176,474)**
A system for intraorally scanning a patient's teeth for a dental procedure, the system comprising:	A dental system for intraorally scanning a patient's teeth for a dental procedure, the dental system comprising:
a hand-held intraoral scanner; and	a hand-held intraoral scanner; and
a computer readable medium including instructions that when executed by a computer system, causes the computer system to:	a computer readable medium including instructions that when executed by a computer system, causes cause the computer system to:
receive first scan data of the patient's teeth from the hand-held intraoral scanner;	receive first 3D intraoral scan data of the patient's teeth from the hand-held intraoral scanner;
display, to a display, a model of the patient's teeth, wherein the model of the	display, to a display, a first 3D surface model of the patient's teeth, wherein the first 3D surface model of the patient's teeth is based on

patient's teeth is based on the received first scan data of the patient's teeth;	the received first 3D intraoral scan data of the patient's teeth;
receive user input defining a portion of the model to be removed;	receive user input defining a surface portion of the first 3D surface model to beremoved;
after receiving the user input, remove, from the displayed model, the portion of the model to be removed according to the user input;	after receiving the user input, remove, from the displayed first 3D surface model, the surface portion of the first 3D surface model to be removed according to the user input;
after removing the portion of the model, receive second scan data of the patient's teeth from the hand-held intraoral scanner;	after removing the surface portion of the first 3D surface model, receive second 3D intraoral scan data of the patient's teeth from the hand-held intraoral scanner, the second 3D intraoral scan data including surface data of a physically changed portion of the patient's intraoral cavity;
register the second scan data with the model by aligning identifying data of the second scan data with corresponding parts of the model;	**(Claim 4)** The system of claim 1, wherein the instructions to replace at least the portion of the removed surface portion of the first 3D surface model with at least the surface portion of the second 3D surface model includes instructions to register the second 3D surface model with the first 3D surface model.

replace at least a portion of the removed surface portion of the model using at least a portion of the received second scan data of the patient's teeth;	replace at least a portion of the removed surface portion of the first 3D surface model with at least a surface portion of a second 3D surface model including the physically changed portion based on the received second 3D intraoral scan data of the patient's teeth to produce a composite 3D surface model of the patient's teeth that is based on the first 3D intraoral scan data and the second 3D intraoral scan data; and
discarding a remainder of the second scan data, including the identifying data, after registering the second scan data with the model; and	**(Claim 7)** The system of claim 6, wherein the instructions to replace at least the portion of the removed surface portion of the first 3D surface model with at least the surface portion of the second 3D surface model includes instruction to discard a remainder of the second 3D surface model, including the identifying surface data, after stitching the surface portion of the second 3D surface model with the first 3D surface model.
output, to the display, the model of the patient's teeth with the portion of the removed portion replaced using the received scan data.	output, to the display, the composite 3D surface model of the patient's teeth.

Dependent claim 18 is equivalent to reference claim 7 with the limitations of reference claim 2 incorporated.

Dependent claim 19 is equivalent to reference claim 7 with the limitations of reference claim 3 incorporated.

Dependent claim 18 is equivalent to reference claim 7, notably including the limitations inherited from reference claim 6.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Allowable Subject Matter

Claims 1-20 would be allowable if rewritten or amended to overcome the double patenting rejections set forth in this Office action.

The following is a statement of reasons for the indication of allowable subject matter: The claims are in effect equivalent to those recited in application **16/176,474**, which was also indicated allowable. The reasoning set forth in that application applies equally to this application:

The claims as recited distinguish over the art of record, and the art as a whole via reciting the updating scans to be directed to scenarios where the intra-oral cavity (e.g. dentition) is modified in between the scans (e.g. subjected to a surface preparation). This distinguishes over the cited references (WIPO publication WO 2007084647 A2 and US Pre-Grant Publications 20070172112, 20020006217, 20070236494, and 20050283065), which deal only with recapturing scans of a static intra-oral region. The scanning methodology disclosed by the closest prior art, the Kriveshko WIPO reference (WO 2007084647 A2), does not provide for (or suggest) generating a composite scan after intra-oral modifications are made. Rather, it teaches away from this, teaching that entirely new scans should be made.

In ¶121-122, the Kriveshko WIPO reference (WO 2007084647 A2) describes an iterative approach to managing a preparation where "a dentist may repeat steps of tooth removal and scanning

until a satisfactory surface preparation is achieved." This has an important distinction from the instant applications' claims, which provide a composite scan based on both a first (initial) and second (post-change) scan. In the Kriveshko reference, a new scan is being gathered each time a preparation is made. The user interface allows for rescanning areas that are subject to errors, equivalent to modifying the first scan with data, but does not disclose that this can be done while the intra-oral region is modified (e.g. via a surface preparation). Rather, the rescanning is done to correct errors with the first scan, and the iterative process disclosed by the reference involves complete rescans (generating an entirely new scan rather than generating a composite scan by using a second scan to update the changed region from the first). See for example the Kriveshko WIPO reference at ¶119, where it discusses the interface used in this process: "The user interface may be adapted for use by a dentist (or dental laboratory) to review a surface preparation... in this mode, new data is not being acquired. Rather, a stored model may be processed." This explicitly teaches away from the claimed process, which data is newly captured and composited to update for the intra-oral modification.

In view of the above, with the Kriveshko WIPO reference representing the closest prior art, the claims distinguish over the art as a whole. The claims further recite eligible subject matter under 35 USC 101, as under the most recent guidance (2019 PEG) they are not directed to a judicial exception.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BIJAN MAPAR whose telephone number is (571)270-3674. The examiner can normally be reached on Monday - Thursday, 11:00-8:30.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Omar F Fernandez Rivas can be reached on 5712722589. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/BIJAN MAPAR/
Primary Examiner, Art Unit 2128

Notice of References Cited	Application/Control No. 16/586,528	Applicant(s)/Patent Under Reexamination Kopelman, Avi	
	Examiner BIJAN MAPAR	Art Unit 2128	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20070172112-A1	07-2007	Paley; Eric B.	G06T17/30	382/154
*	B	US-20020006217-A1	01-2002	Rubbert, Rudger	A61C7/00	382/131
*	C	US-20070236494-A1	10-2007	Kriveshko; Ilya A.	G01B11/24	345/419
*	D	US-20050283065-A1	12-2005	Babayoff, Noam	A61B1/00009	600/407
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N	WO-2007084647-A2	07-2007	WO	KRIVESHKO ILYA A	G06T1/0007
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/586,528	Kopelman, Avi
	Examiner	Art Unit
	BIJAN MAPAR	2128

CPC - Searched*		
Symbol	Date	Examiner

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
Searched EAST for prior art (see query)	02/18/2020	Bijan Mapar
inventor search in PALM	02/18/2020	Bijan Mapar
partial search of CPC G06F17/50, G06T19/20, G06T7/0012, A61C7/002	02/18/2020	Bijan Mapar
Assignee search in EAST	02/18/2020	Bijan Mapar
IPR2019-00134 Reviewed Petition for Inter Partes Review of U.S. Patent No. 9,299,192	02/18/2020	Bijan Mapar

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

/BIJAN MAPAR/ Primary Examiner, Art Unit 2128	

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/586,528	Kopelman, Avi
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/BIJAN MAPAR/ Primary Examiner, Art Unit 2128	

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
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	Examiner	**Art Unit**
	BIJAN MAPAR	2128

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	02/18/2020								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
	6	✓								
	7	✓								
	8	✓								
	9	✓								
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	16	✓								
	17	✓								
	18	✓								
	19	✓								
	20	✓								

ClearCorrect Exhibit 1002, Page 102 of 437

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1	"15050673".apnr.	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L2	3	"7476100".pn. or "7347686".pn. or "20030215764".pn.	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L3	3	"20060263738".pn. or "20040029078".pn. or "20030215764".pn.	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L4	168	("20020006597" | "20030009252" | "20030139834" | "20030224311" | "20040128010" | "20050055118" | "20100114351" | "20130110469" | "2467432" | "3407500" | "3600500" | "3600808" | "3660900" | "3683502" | "3738005" | "3860803" | "3916526" | "3922786" | "3950851" | "3983628" | "4014096" | "4195046" | "4253828" | "4324546" | "4324547" | "4348178" | "4478580" | "4500294" | "4504225" | "4505673" | "4526540" | "4575330" | "4575805" | "4591341" | "4609349" | "4611288" | "4656860" | "4663720" | "4664626" | "4676747" | "4742464" | "4755139" | "4763791" | "4793803" | "4798534" | "4836778" | "4837732" | "4850864" | "4850865" | "4856991" | "4877398" | "4880380" | "4889238" | "4890608" | "4935635" | "4936862" | "4937928" | "4941826" | "4964770" | "4975052" | "4983334" | "5011405" | "5017133" | "5027281" | "5035613" | "5055039" | "5059118" | "5100316" | "5121333" | "5125832" | "5128870" | "5130064" | "5131843" | "5131844" | "5139419" | "5142364" | "5145364" | "5176517" | "5184306" | "5186623" | "5257203" | "5273429" | "5278756" | "5328362" | "5338198" | "5340309" | "5342202" | "5368478" | "5382164" | "5395238" | "5431562" | "5440326" | "5440496" | "5447432" | "5452219" | "5454717" | "5456600" | "5474448" | "5518397" | "5528735" | "5533895" | "5542842" | "5549476" | "5562448" | "5587912" | "5605459" | "5607305" | "5614075" | "5621648" | "5645420" | "5645421" | "5655653" | "5683243" | "5692894" | "5725376" | "5725378" | "5733126" | "5740267" | "5742700" | "5748115" | "5799100" | "5800174" | "5823778" | "5848115" | "5857853" | "5866058" |	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26

		"5879158" | "5880961" | "5880962" | "5934288" | "5957686" | "5964587" | "5971754" | "5975893" | "6015289" | "6044309" | "6049743" | "6062861" | "6068482" | "6099314" | "6123544" | "6152731" | "6183248" | "6190165" | "6217325" | "6217334" | "6244861" | "6309215" | "6315553" | "6322359" | "6334853" | "6350120" | "6382975" | "6398548" | "6402707" | "6482298" | "6524101" | "6554611" | "6572372" | "6629840" | "6705863" | "6722880" | "6739869" | "7347686" | "7476100" | "7536234" | "9299192" | "RE35169").PN.				
L5	1	"20050177266".pn.	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L6	1	"20020006217".pn.	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L7	1656	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L8	462	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remove or replace or modify) with (model or image)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L9	1025	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or modif$8) with (model or image)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L10	983	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or modif$8) with (model or image) and surface	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L11	754	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or modif$8) with (model or image) and surface and (obscur$5 or block$4 or occlude$4)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L12	319	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26

		modif$8) with (model or image) and surface same (obscur$5 or block$4 or occlude$4)				
L13	216	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or modif$8) with (model or image) and surface same (obscur$5 or block$4 or occlude$4) and cavity	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L14	0	(G06F17/50.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L15	96	(G06T19/20.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L16	112	(G06T7/0012.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L17	405	(A61C7/002.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L18	1153	"align technology".as. or "align technology".aanm.	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L19	911	"align technology".as. or "align technology".aanm. and (scan or image) with (composit$4 or combin$6 or regist$6)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L20	873	"align technology".as. or "align technology".aanm. and (scan or image) with (composit$4 or combin$6 or regist$6) and (remov$3 or replac$3 or modif$8) with (model or image)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L21	91	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and finish adj line	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L22	14	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and finish adj line and @PD<"20100719"	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L23	1	"15050673".apnr.	US-	OR	OFF	2020/02/18

			PGPUB; USPAT			03:26
L24	3	"7476100".pn. or "7347686".pn. or "20030215764".pn.	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L25	3	"20060263738".pn. or "20040029078".pn. or "20030215764".pn.	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L26	168	("20020006597" | "20030009252" | "20030139834" | "20030224311" | "20040128010" | "20050055118" | "20100114351" | "20130110469" | "2467432" | "3407500" | "3600500" | "3600808" | "3660900" | "3683502" | "3738005" | "3860803" | "3916526" | "3922786" | "3950851" | "3983628" | "4014096" | "4195046" | "4253828" | "4324546" | "4324547" | "4348178" | "4478580" | "4500294" | "4504225" | "4505673" | "4526540" | "4575330" | "4575805" | "4591341" | "4609349" | "4611288" | "4656860" | "4663720" | "4664626" | "4676747" | "4742464" | "4755139" | "4763791" | "4793803" | "4798534" | "4836778" | "4837732" | "4850864" | "4850865" | "4856991" | "4877398" | "4880380" | "4889238" | "4890608" | "4935635" | "4936862" | "4937928" | "4941826" | "4964770" | "4975052" | "4983334" | "5011405" | "5017133" | "5027281" | "5035613" | "5055039" | "5059118" | "5100316" | "5121333" | "5125832" | "5128870" | "5130064" | "5131843" | "5131844" | "5139419" | "5142364" | "5145364" | "5176517" | "5184306" | "5186623" | "5257203" | "5273429" | "5278756" | "5328362" | "5338198" | "5340309" | "5342202" | "5368478" | "5382164" | "5395238" | "5431562" | "5440326" | "5440496" | "5447432" | "5452219" | "5454717" | "5456600" | "5474448" | "5518397" | "5528735" | "5533895" | "5542842" | "5549476" | "5562448" | "5587912" | "5605459" | "5607305" | "5614075" | "5621648" | "5645420" | "5645421" | "5655653" | "5683243" | "5692894" | "5725376" | "5725378" | "5733126" | "5740267" | "5742700" | "5748115" | "5799100" | "5800174" | "5823778" | "5848115" | "5857853" | "5866058" | "5879158" | "5880961" | "5880962" | "5934288" | "5957686" | "5964587" | "5971754" | "5975893" | "6015289" | "6044309" | "6049743" | "6062861" | "6068482" | "6099314" | "6123544" | "6152731" | "6183248" | "6190165" | "6217325" | "6217334" | "6244861" | "6309215" | "6315553" | "6322359" | "6334853" | "6350120" | "6382975" | "6398548" | "6402707" | "6482298" | "6524101" | "6554611" | "6572372" | "6629840" | "6705863" | "6722880" |	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26

		"6739869" | "7347686" | "7476100" | "7536234" | "9299192" | "RE35169").PN.				
L27	1	"20050177266".pn.	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L28	1	"20020006217".pn.	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L29	1656	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L30	462	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remove or replace or modify) with (model or image)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L31	1025	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or modif$8) with (model or image)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L32	983	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or modif$8) with (model or image) and surface	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L33	754	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or modif$8) with (model or image) and surface and (obscur$5 or block$4 or occlude$4)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L34	319	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or modif$8) with (model or image) and surface same (obscur$5 or block$4 or occlude$4)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L35	216	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or modif$8) with (model or image) and surface same (obscur$5 or block$4 or occlude$4) and cavity	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26

L36	0	(G06F17/50.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L37	96	(G06T19/20.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L38	112	(G06T7/0012.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L39	405	(A61C7/002.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L40	1153	"align technology".as. or "align technology".aanm.	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L41	911	"align technology".as. or "align technology".aanm. and (scan or image) with (composit$4 or combin$6 or regist$6)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L42	873	"align technology".as. or "align technology".aanm. and (scan or image) with (composit$4 or combin$6 or regist$6) and (remov$3 or replac$3 or modif$8) with (model or image)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L43	91	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and finish adj line	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L44	14	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and finish adj line and @PD<"20100719"	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L51	1	"15050673".apnr.	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L52	3	"7476100".pn. or "7347686".pn. or "20030215764".pn.	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L53	3	"20060263738".pn. or "20040029078".pn. or "20030215764".pn.	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L54	168	("20020006597" | "20030009252" | "20030139834" | "20030224311" | "20040128010" | "20050055118" |	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26

		"20100114351" | "20130110469" | "2467432" | "3407500" | "3600500" | "3600808" | "3660900" | "3683502" | "3738005" | "3860803" | "3916526" | "3922786" | "3950851" | "3983628" | "4014096" | "4195046" | "4253828" | "4324546" | "4324547" | "4348178" | "4478580" | "4500294" | "4504225" | "4505673" | "4526540" | "4575330" | "4575805" | "4591341" | "4609349" | "4611288" | "4656860" | "4663720" | "4664626" | "4676747" | "4742464" | "4755139" | "4763791" | "4793803" | "4798534" | "4836778" | "4837732" | "4850864" | "4850865" | "4856991" | "4877398" | "4880380" | "4889238" | "4890608" | "4935635" | "4936862" | "4937928" | "4941826" | "4964770" | "4975052" | "4983334" | "5011405" | "5017133" | "5027281" | "5035613" | "5055039" | "5059118" | "5100316" | "5121333" | "5125832" | "5128870" | "5130064" | "5131843" | "5131844" | "5139419" | "5142364" | "5145364" | "5176517" | "5184306" | "5186623" | "5257203" | "5273429" | "5278756" | "5328362" | "5338198" | "5340309" | "5342202" | "5368478" | "5382164" | "5395238" | "5431562" | "5440326" | "5440496" | "5447432" | "5452219" | "5454717" | "5456600" | "5474448" | "5518397" | "5528735" | "5533895" | "5542842" | "5549476" | "5562448" | "5587912" | "5605459" | "5607305" | "5614075" | "5621648" | "5645420" | "5645421" | "5655653" | "5683243" | "5692894" | "5725376" | "5725378" | "5733126" | "5740267" | "5742700" | "5748115" | "5799100" | "5800174" | "5823778" | "5848115" | "5857853" | "5866058" | "5879158" | "5880961" | "5880962" | "5934288" | "5957686" | "5964587" | "5971754" | "5975893" | "6015289" | "6044309" | "6049743" | "6062861" | "6068482" | "6099314" | "6123544" | "6152731" | "6183248" | "6190165" | "6217325" | "6217334" | "6244861" | "6309215" | "6315553" | "6322359" | "6334853" | "6350120" | "6382975" | "6398548" | "6402707" | "6482298" | "6524101" | "6554611" | "6572372" | "6629840" | "6705863" | "6722880" | "6739869" | "7347686" | "7476100" | "7536234" | "9299192" | "RE35169").PN.				
L55	1	"20050177266".pn.	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L56	1	"20020006217".pn.	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L57	1656	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26

		dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)				
L58	462	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remove or replace or modify) with (model or image)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L59	1025	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or modif$8) with (model or image)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L60	983	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or modif$8) with (model or image) and surface	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L61	754	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or modif$8) with (model or image) and surface and (obscur$5 or block$4 or occlude$4)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L62	319	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or modif$8) with (model or image) and surface same (obscur$5 or block$4 or occlude$4)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L63	216	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or modif$8) with (model or image) and surface same (obscur$5 or block$4 or occlude$4) and cavity	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L64	0	(G06F17/50.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L65	96	(G06T19/20.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26

L66	112	(G06T7/0012.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L67	405	(A61C7/002.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L68	1153	"align technology".as. or "align technology".aanm.	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L69	911	"align technology".as. or "align technology".aanm. and (scan or image) with (composit$4 or combin$6 or regist$6)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L70	873	"align technology".as. or "align technology".aanm. and (scan or image) with (composit$4 or combin$6 or regist$6) and (remov$3 or replac$3 or modif$8) with (model or image)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L71	91	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and finish adj line	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L72	14	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and finish adj line and @PD<"20100719"	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
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L79	1656	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L80	462	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remove or replace or modify) with (model or image)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L81	1025	(dental or dentition or oral or intra-oral) with	US-	OR	OFF	2020/02/18

		model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or modif$8) with (model or image)	PGPUB; USPAT			03:26
L82	983	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or modif$8) with (model or image) and surface	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L83	754	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or modif$8) with (model or image) and surface and (obscur$5 or block$4 or occlude$4)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:27
L84	319	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or modif$8) with (model or image) and surface same (obscur$5 or block$4 or occlude$4)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:27
L85	216	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or modif$8) with (model or image) and surface same (obscur$5 or block$4 or occlude$4) and cavity	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:27
L86	0	(G06F17/50.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:27
L87	96	(G06T19/20.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:27
L88	112	(G06T7/0012.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:27
L89	405	(A61C7/002.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:27

		dimensional)) same (scan or image or model)				
L90	1153	"align technology".as. or "align technology".aanm.	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:27
L91	911	"align technology".as. or "align technology".aanm. and (scan or image) with (composit$4 or combin$6 or regist$6)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:27
L92	873	"align technology".as. or "align technology".aanm. and (scan or image) with (composit$4 or combin$6 or regist$6) and (remov$3 or replac$3 or modif$8) with (model or image)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:27
L93	91	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and finish adj line	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:27
L94	14	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and finish adj line and @PD<"20100719"	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:27

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L45	405	(A61C7/002.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
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L47	96	(G06T19/20.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L48	112	(G06T7/0012.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L49	14	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and finish adj line	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26

		and @PD< "20100719"				
L50	91	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and finish adj line	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:26
L95	405	(A61C7/002.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:27
L96	0	(G06F17/50.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:27
L97	96	(G06T19/20.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:27
L98	112	(G06T7/0012.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:27
L99	14	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and finish adj line and @PD< "20100719"	US-PGPUB; USPAT	OR	OFF	2020/02/18 03:27
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2/18/2020 3:46:13 AM
C:\Users\bmapar\Documents\EAST\Workspaces\15050673 Virtual Models.wsp

Bibliographic Data

Application No: 16/586,528

Foreign Priority claimed: ○ Yes ◉ No

35 USC 119 (a-d) conditions met: ☐ Yes ☑ No ☐ Met After Allowance

Verified and Acknowledged: /BIJAN MAPAR/ Examiner's Signature | Initials

Title: METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
09/27/2019	703	2128	22773-822.303
RULE			

APPLICANTS

Align Technology, Inc., San Jose, CA,

INVENTORS

Avi Kopelman Palo Alto, CA, UNITED STATES

CONTINUING DATA

This application is a CON of 15050673 02/23/2016

15050673 is a CON of 13574723 01/04/2013 PAT 9299192

13574723 is a 371 of PCT/IL11/00574 07/19/2011

PCT/IL11/00574 has PRO of 61365556 07/19/2010

FOREIGN APPLICATIONS

IF REQUIRED, FOREIGN LICENSE GRANTED**

10/10/2019

STATE OR COUNTRY

UNITED STATES

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650 Page Mill Road
Palo Alto, CA 94304
UNITED STATES

FILING FEE RECEIVED

$5,860

PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/586,528	Filing Date 09/27/2019	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $460 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

AMENDMENT	03/19/2020	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 20	Minus	** 20	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0		x $460 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	HSLIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/MERILYN S WATTS/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 32

Complete if Known	
Application Number	16/586,528
Filing Date	09-27-2019
First Named Inventor	KOPELMAN; Avi
Art Unit	2128
Examiner Name	MAPAR, BIJAN
Attorney Docket Number	22773-822.303

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	001	US-RE35169	03-05-1996	LEMCHEN; Marc S. [Us] et al.	
	002	US-2467432	04-19-1949	KESLING; Harold D.	
	003	US-3407500	10-29-1968	KESLING; Peter C.	
	004	US-3600808	08-24-1971	REEVE; James Jackson. et al.	
	005	US-3660900	05-09-1972	ANDREWS; Lawrence F. et al.	
	006	US-3683502	08-15-1972	WALLSHEIN; Melvin. et al.	
	007	US-3738005	06-12-1973	COHEN; M. et al.	
	008	US-3860803	01-14-1975	LEVINE; Richard Carl.	
	009	US-3916526	11-04-1975	SCHUDY; Fred Frank.	
	010	US-3922786	12-02-1975	LAVIN; Joseph L.	
	011	US-3950851	04-20-1976	BERGERSEN; Earl O.	
	012	US-3983628	10-05-1976	ACEVEDO; Raul.	
	013	US-4014096	03-29-1977	DELLINGER; Eugene L.	
	014	US-4195046	03-25-1980	KESLING; Peter C. [Us] et al.	
	015	US-4253828	03-03-1981	COLES; Donna C. et al.	
	016	US-4324546	04-13-1982	HEITLINGER; Paul. et al.	
	017	US-4324547	04-13-1982	ARCAN; Mircea. et al.	
	018	US-4348178	09-07-1982	KURZ; Craven H.	
	019	US-4478580	10-23-1984	BARRUT; Luc P. [Fr] et al.	
	020	US-4500294	02-19-1985	LEWIS; William D. [Us] et al.	

Examiner Signature		Date Considered	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 2 of 32

Complete if Known	
Application Number	16/586,528
Filing Date	09-27-2019
First Named Inventor	KOPELMAN; Avi
Art Unit	2128
Examiner Name	MAPAR, BIJAN
Attorney Docket Number	22773-822.303

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.	Document Number / Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	021	US-4504225	03-12-1985	YOSHII; Osamu.	
	022	US-4505673	03-19-1985	YOSHII; Osamu [Jp] et al.	
	023	US-4526540	07-02-1985	DELLINGER; Eugene L. [Us] et al.	
	024	US-4575330	03-11-1986	HULL; Charles W. [Us] et al.	
	025	US-4575805	03-11-1986	MOERMANN; Werner H. [Ch] et al.	
	026	US-4591341	05-27-1986	ANDREWS; Lawrence F. [Us] et al.	
	027	US-4609349	09-02-1986	CAIN; Steve B. [Us] et al.	
	028	US-4611288	09-09-1986	DURET; Francois [Fr] et al.	
	029	US-4656860	04-14-1987	ORTHUBER; Wolfgang [De] et al.	
	030	US-4663720	05-05-1987	DURET; Francois [Fr] et al.	
	031	US-4664626	05-12-1987	KESLING; Peter C. [Us] et al.	
	032	US-4676747	06-30-1987	KESLING; Christopher K. [Us] et al.	
	033	US-4742464	05-03-1988	DURET; Francois. et al.	
	034	US-4755139	07-05-1988	ABBATTE; Gerard P. [Us] et al.	
	035	US-4763791	08-16-1988	HALVERSON; George E. [Us] et al.	
	036	US-4793803	12-27-1988	MARTZ; Martin G. [Us] et al.	
	037	US-4798534	01-17-1989	BREADS; Peter R. [Us] et al.	
	038	US-4836778	06-06-1989	BAUMRIND; Sheldon [Us] et al.	

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Sheet 3 of 32

Complete if Known	
Application Number	16/586,528
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First Named Inventor	KOPELMAN; Avi
Art Unit	2128
Examiner Name	MAPAR, BIJAN
Attorney Docket Number	22773-822.303

U. S. PATENT DOCUMENTS

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	039	US-4837732	06-06-1989	BRANDESTINI; Marco [Ch] et al.	
	040	US-4850864	07-25-1989	DIAMOND; Michael K. [Us] et al.	
	041	US-4850865	07-25-1989	NAPOLITANO; John R. [Us] et al.	
	042	US-4856991	08-15-1989	BREADS; Peter R. [Us] et al.	
	043	US-4877398	10-31-1989	KESLING; Peter C. [Us] et al.	
	044	US-4880380	11-14-1989	MARTZ; Martin G. [Us] et al.	
	045	US-4889238	12-26-1989	BATCHELOR; Jay A. [Us] et al.	
	046	US-4890608	01-02-1990	STEER; Peter L. [Gb] et al.	
	047	US-4935635	06-19-1990	O'HARRA; Dale G. [Us] et al.	
	048	US-4936862	06-26-1990	WALKER; Peter S. [Gb] et al.	
	049	US-4937928	07-03-1990	VAN; Der Zel Joseph M. [Nl] et al.	
	050	US-4941826	07-17-1990	LORAN; William [Us] et al.	
	051	US-4964770	10-23-1990	STEINBICHLER; Hans [De] et al.	
	052	US-4975052	12-04-1990	SPENCER; William [Us] et al.	
	053	US-4983334	01-08-1991	ADELL; Loren S. [Us] et al.	
	054	US-5011405	04-30-1991	LEMCHEN; Marc S.	
	055	US-5017133	05-21-1991	MIURA; Fujio [Jp] et al.	

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Sheet 4 of 32

Complete if Known	
Application Number	16/586,528
Filing Date	09-27-2019
First Named Inventor	KOPELMAN; Avi
Art Unit	2128
Examiner Name	MAPAR, BIJAN
Attorney Docket Number	22773-822.303

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	056	US-5027281	06-25-1991	REKOW; Elizabeth D. [Us] et al.	
	057	US-5035613	07-30-1991	BREADS; Peter R. [Us] et al.	
	058	US-5055039	10-08-1991	ABBATTE; Gerard P. [Us] et al.	
	059	US-5059118	10-22-1991	BREADS; Peter R. [Us] et al.	
	060	US-5100316	03-31-1992	WILDMAN; Alexander J. [Us] et al.	
	061	US-5121333	06-09-1992	RILEY; Donald R. [Us] et al.	
	062	US-5125832	06-30-1992	KESLING; Peter C.	
	063	US-5128870	07-07-1992	ERDMAN; Arthur G. [Us] et al.	
	064	US-5130064	07-14-1992	SMALLEY; Dennis R. [Us] et al.	
	065	US-5131843	07-21-1992	HILGERS; James J. [Us] et al.	
	066	US-5131844	07-21-1992	MARINACCIO; Paul J. [Us] et al.	
	067	US-5139419	08-18-1992	ANDREIKO; Craig A. [Us] et al.	
	068	US-5145364	09-08-1992	MARTZ; Martin G. [Us] et al.	
	069	US-5176517	01-05-1993	TRUAX; Lloyd H. [Us] et al.	
	070	US-5184306	02-02-1993	ERDMAN; Arthur G. et al.	
	071	US-5186623	02-16-1993	BREADS; Peter R. [Us] et al.	
	072	US-5257203	10-26-1993	RILEY; Donald R. et al.	

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Sheet 5 of 32

Complete if Known	
Application Number	16/586,528
Filing Date	09-27-2019
First Named Inventor	KOPELMAN; Avi
Art Unit	2128
Examiner Name	MAPAR, BIJAN
Attorney Docket Number	22773-822.303

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	073	US-5273429	12-28-1993	REKOW; Dianne [Us] et al.	
	074	US-5278756	01-11-1994	LEMCHEN; Marc S. [Us] et al.	
	075	US-5328362	07-12-1994	WATSON; Sherman L. et al.	
	076	US-5338198	08-16-1994	WU; Chuang-Jy [Ca] et al.	
	077	US-5340309	08-23-1994	ROBERTSON; James G. [Us] et al.	
	078	US-5342202	08-30-1994	DESHAYES; Marie-Josephe [Fr] et al.	
	079	US-5368478	11-29-1994	ANDREIKO; Craig A. [Us] et al.	
	080	US-5382164	01-17-1995	STERN; Sylvan S. [Us] et al.	
	081	US-5395238	03-07-1995	ANDREIKO; Craig A. [Us] et al.	
	082	US-5431562	07-11-1995	ANDREIKO; Craig A. [Us] et al.	
	083	US-5440326	08-08-1995	QUINN; Thomas J. [Us] et al.	
	084	US-5440496	08-08-1995	ANDERSSON; Matts [Se] et al.	
	085	US-5447432	09-05-1995	ANDREIKO; Craig A. [Us] et al.	
	086	US-5452219	09-19-1995	DEHOFF; Barry D. [Us] et al.	
	087	US-5454717	10-03-1995	ANDREIKO; Craig A. [Us] et al.	
	088	US-5456600	10-10-1995	ANDREIKO; Craig A. [Us] et al.	

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Sheet 6 of 32

Complete if Known	
Application Number	16/586,528
Filing Date	09-27-2019
First Named Inventor	KOPELMAN; Avi
Art Unit	2128
Examiner Name	MAPAR, BIJAN
Attorney Docket Number	22773-822.303

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	089	US-5474448	12-12-1995	ANDREIKO; Craig A. [Us] et al.	
	090	US-5518397	05-21-1996	ANDREIKO; Craig A. et al.	
	091	US-5528735	06-18-1996	STRASNICK; Steven L. [Us] et al.	
	092	US-5533895	07-09-1996	ANDREIKO; Craig A. [Us] et al.	
	093	US-5542842	08-06-1996	ANDREIKO; Craig A. [Us] et al.	
	094	US-5549476	08-27-1996	STERN; Sylvan S. [Us] et al.	
	095	US-5562448	10-08-1996	MUSHABAC; David R.	
	096	US-5587912	12-24-1996	ANDERSSON; Matts [Se] et al.	
	097	US-5605459	02-25-1997	KURODA; Takayuki [Jp] et al.	
	098	US-5607305	03-04-1997	ANDERSSON; Matts [Se] et al.	
	099	US-5614075	03-25-1997	ANDRE Sr.; Larry E. [Us] et al.	
	100	US-5621648	04-15-1997	CRUMP; Craig D. [Us] et al.	
	101	US-5645420	07-08-1997	BERGERSEN; Earl O. [Us] et al.	
	102	US-5645421	07-08-1997	SLOOTSKY; Gary Lee [Us] et al.	
	103	US-5655653	08-12-1997	CHESTER; Bruce E. [Us] et al.	
	104	US-5683243	11-04-1997	ANDREIKO; Craig A. [Us] et al.	

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Sheet 7 of 32

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First Named Inventor	KOPELMAN; Avi
Art Unit	2128
Examiner Name	MAPAR, BIJAN
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	105	US-5692894	12-02-1997	SCHWARTZ; Dann A. [Us] et al.	
	106	US-5725376	03-10-1998	POIRIER; Michel [Ca] et al.	
	107	US-5725378	03-10-1998	WANG; Hong-Chi [Tw] et al.	
	108	US-5733126	03-31-1998	ANDERSSON; Matts. et al.	
	109	US-5740267	04-14-1998	ECHERER; Scott J. [Us] et al.	
	110	US-5742700	04-21-1998	YOON; Douglas C. [Us] et al.	
	111	US-5799100	08-25-1998	CLARKE; Laurence P. [Us] et al.	
	112	US-5800174	09-01-1998	ANDERSSON; Matts [Se] et al.	
	113	US-5823778	10-20-1998	SCHMITT; Stephen M. [Us] et al.	
	114	US-5848115	12-08-1998	LITTLE; Francis H. [Us] et al.	
	115	US-5857853	01-12-1999	VAN; Nifterick Willem Frederick [Nl] et al.	
	116	US-5866058	02-02-1999	BATCHELDER; John Samuel [Us] et al.	
	117	US-5879158	03-09-1999	DOYLE; Walter A. [Us] et al.	
	118	US-5880961	03-09-1999	CRUMP; Craig D. [Us] et al.	
	119	US-5880962	03-09-1999	ANDERSSON; Matts [Se] et al.	
	120	US-5934288	08-10-1999	AVILA; Ricardo Scott [Us] et al.	
	121	US-5957686	09-28-1999	ANTHONY; Wayne L. [Us] et al.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 8 of 32

Complete if Known	
Application Number	16/586,528
Filing Date	09-27-2019
First Named Inventor	KOPELMAN; Avi
Art Unit	2128
Examiner Name	MAPAR, BIJAN
Attorney Docket Number	22773-822.303

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	122	US-5964587	10-12-1999	SATO; Mikio [Jp] et al.	
	123	US-5971754	10-26-1999	SONDHI; Anoop. et al.	
	124	US-5975893	11-02-1999	CHISHTI; Muhammad. et al.	
	125	US-6015289	01-18-2000	ANDREIKO; Craig A. et al.	
	126	US-6044309	03-28-2000	HONDA; Kenichi [Jp] et al.	
	127	US-6049743	04-11-2000	BABA; Masami [Jp] et al.	
	128	US-6062861	05-16-2000	ANDERSSON; Matts.	
	129	US-6068482	05-30-2000	SNOW; Michael Desmond [Au] et al.	
	130	US-6099314	08-08-2000	KOPELMAN; Avi [Il] et al.	
	131	US-6123544	09-26-2000	CLEARY; James D.	
	132	US-6152731	11-28-2000	JORDAN; Russell A. [Us] et al.	
	133	US-6183248	02-06-2001	CHISHTI; Muhammad. et al.	
	134	US-6190165	02-20-2001	ANDREIKO; Craig A. [Us] et al.	
	135	US-6217325	04-17-2001	CHISHTI; Muhammad. et al.	
	136	US-6217334	04-17-2001	HULTGREN; Bruce Willard [Us] et al.	
	137	US-6227850	05-08-2001	CHISHTI; Muhammad Ziaullah Khan [Us] et al.	
	138	US-6244861	06-12-2001	ANDREIKO; Craig A. et al.	
	139	US-6309215	10-30-2001	PHAN; Loc X. et al.	
	140	US-6315553	11-13-2001	SACHDEVA; Rohit [Us] et al.	

Examiner Signature		Date Considered	

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Sheet 9 of 32

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Art Unit	2128
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Attorney Docket Number	22773-822.303

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	141	US-6322359	11-27-2001	JORDAN; Russell A. et al.	
	142	US-6334853	01-01-2002	KOPELMAN; Avi. et al.	
	143	US-6350120	02-26-2002	SACHDEVA; Rohit [Us] et al.	
	144	US-6382975	05-07-2002	POIRIER; Michel [Ca] et al.	
	145	US-6398548	06-04-2002	MUHAMMAD; Chishti. et al.	
	146	US-6402707	06-11-2002	ERNST; Maurice M. [Il] et al.	
	147	US-6482298	11-19-2002	BHATNAGAR; Parijat [Us] et al.	
	148	US-6524101	02-25-2003	PHAN; Loc X. [Us] et al.	
	149	US-6554611	04-29-2003	SHISHTI; Muhammad. et al.	
	150	US-6572372	06-03-2003	PHAN; Loc X. [Us] et al.	
	151	US-6629840	10-07-2003	CHISHTI; Muhammad. et al.	
	152	US-6705863	03-16-2004	PHAN; Loc X. [Us] et al.	
	153	US-6722880	04-20-2004	CHISHTI; Muhammad. et al.	
	154	US-6739869	05-25-2004	TAUB; Eldad. et al.	
	155	US-7029275	04-18-2006	RUBBERT; Ruedger. et al.	
	156	US-7347686	03-25-2008	MARSHALL; Michael Craig [Us] et al.	
	157	US-7476100	01-13-2009	KUO; Eric E. [Us] et al.	
	158	US-7536234	05-19-2009	KOPELMAN; Avi. et al.	
	159	US-7555403	06-30-2009	KOPELMAN; Avi. et al.	
	160	US-9299192	03-29-2016	KOPELMAN; Avi.	

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Sheet 10 of 32

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Filing Date	09-27-2019
First Named Inventor	KOPELMAN; Avi
Art Unit	2128
Examiner Name	MAPAR, BIJAN
Attorney Docket Number	22773-822.303

U. S. PATENT DOCUMENTS

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	161	US-20020006217	01-17-2002	RUBBERT; Rudger. et al.	
	162	US-20020006597	01-17-2002	ANDREIKO; Craig A. et al.	
	163	US-20030009252	01-09-2003	PAVLOVSKAIA; Elena [Us] et al.	
	164	US-20030139834	07-24-2003	NIKOLSKIY; Sergey [Ru] et al.	
	165	US-20030215764	11-20-2003	KOPELMAN; Avi. et al.	
	166	US-20030224311	12-04-2003	CRONAUER; Edward A. [Us] et al.	
	167	US-20030232302	12-18-2003	BABAYOFF; Noam [Il] et al.	
	168	US-20040128010	07-01-2004	PAVLOVSKAIA; Elena. et al.	
	169	US-20040155975	08-12-2004	HART; Douglas P. et al.	
	170	US-20050055118	03-10-2005	NIKOLSKIY; Sergey. et al.	
	171	US-20050283065	12-22-2005	BABAYOFF; Noam.	
	172	US-20070015111	01-18-2007	KOPELMAN; Avi. et al.	
	173	US-20070172112	07-26-2007	PALEY; Eric B. et al.	
	174	US-20070236494	10-11-2007	KRIVESHKO; Ilya A.	
	175	US-20080206705	08-28-2008	KAZA; Srinivas [Us] et al.	
	176	US-20090316966	12-24-2009	MARSHALL; Michael Craig. et al.	
	177	US-20100114351	05-06-2010	KOPELMAN; Avi. et al.	
	178	US-20130110469	05-02-2013	KOPELMAN; Avi [Us] et al.	

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Sheet 11 of 32

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Application Number	16/586,528
Filing Date	09-27-2019
First Named Inventor	KOPELMAN; Avi
Art Unit	2128
Examiner Name	MAPAR, BIJAN
Attorney Docket Number	22773-822.303

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]
	001	AU-3031677-A	05-10-1979	SUYEHIRO H .		☐
	002	AU-517102-B2	07-09-1981	HITO SUYEHIRO.		☐
	003	AU-5598894-A	06-08-1994	ORMCO CORP.		☐
	004	CA-1121955-A	04-20-1982	SUYEHIRO HITO.		☐
	005	DE-2749802-A1	05-11-1978	SUYEHIRO HITO.	Abstract:	☒
	006	DE-69327661-T2	07-20-2000	ORMCO CORP [US]	Abstract:	☒
	007	EP-0091876-A1	10-19-1983	DURET FRANCOIS [FR], et al.	Abstract:	☒
	008	EP-0299490-A2	01-18-1989	STEINBICHLER HANS [DE]	Abstract:	☒
	009	EP-0376873-A2	07-04-1990	SHAFIR AARON [IL], et al.		☐
	010	EP-0490848-A2	06-17-1992	NOBELPHARMA AB [SE]		☐

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Sheet 12 of 32

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Application Number	16/586,528
Filing Date	09-27-2019
First Named Inventor	KOPELMAN; Avi
Art Unit	2128
Examiner Name	MAPAR, BIJAN
Attorney Docket Number	22773-822.303

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	011	EP-0541500-A1	05-12-1993	NOBELPHARMA AB [SE]		☐
	012	EP-0667753-B1	01-19-2000	ORMCO CORP [US]		☐
	013	EP-0731673-B1	05-30-2001	NOBEL BIOCARE AB [SE]		☐
	014	EP-0774933-B1	12-06-2000	SANDVIK AB [SE], et al.		☐
	015	EP-1901235-A1	03-19-2008	HONDA RES INST EUROPE GMBH [DE]		☐
	016	ES-463897-A1	01-01-1980	HITO SUYEHIRO D [US]	Abstract:	☒
	017	FR-2369828-A1	06-02-1978	SUYEHIRO HITO [US]	Abstract:	☒
	018	FR-2652256-A1	03-29-1991	JOURDA GERARD., et al.	Abstract:	☒
	019	GB-1550777-A	08-22-1979	SUYEHIRO H.		☐
	020	JP-08508174	09-03-1996	ANDREIKO et al.		☐

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	021	JP-H0428359-A	01-30-1992	MITSUBISHI PETROCHEMICAL CO.	Abstract:	☒
	022	JP-H08508174-A	09-03-1996	ORMCO CORP.	Abstract:	☒
	023	JP-S5358191-A	05-25-1978	YOSHII OSAMU., et al.	Abstract:	☒
	024	WO-0008415-A1	02-17-2000	CADENT LTD [IL], et al.		☐
	025	WO-03094102-A1	11-13-2003	ORAMETRIX INC [US]		☐
	026	WO-2004087000-A1	10-14-2004	CADENT LTD [IL], et al.		☐
	027	WO-2009146164-A1	12-03-2009	BIOMET 3I LLC [US], et al.		☐
	028	WO-2010001401-A1	01-07-2010	CADENT LTD [IL], et al.		☐
	029	WO-2012011101-A2	01-26-2012	CADENT LTD [IL], et al.		☐
	030	WO-9008512-A1	08-09-1990	DOLPHIN IMAGING SYSTEMS INC [US]		☐

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	031	WO-9104713-A1	04-18-1991	JOURDA GERARD [FR], et al.	Abstract:	☒
	032	WO-9410935-A1	05-26-1994	ORMCO CORP [US]		☐
	033	WO-9832394-A1	07-30-1998	HULTGREN BRUCE WILLARD [US]		☐
	034	WO-9844865-A1	10-15-1998	NOBEL BIOCARE AB [SE], et al.		☐
	035	WO-9858596-A1	12-30-1998	ALIGN TECHNOLOGY INC [US], et al.		☐

NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
	001	AADR. AMERICAN ASSOCIATION FOR DENTAL RESEARCH, Summary of Activities, March 20-23,1980, Los Angeles, CA, p. 195.	☐
	002	ALCANIZ, et al., "An Advanced System for the Simulation and Planning of Orthodontic Treatments," Karl Heinz Hohne and Ron Kikinis (eds.), Visualization in Biomedical Computing, 4th Intl. Conf., VBC '96, Hamburg, Germany, September 22-25, 1996, Springer-Verlag, pp. 511-520.	☐

Examiner Signature		Date Considered	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 15 of 32

Complete if Known	
Application Number	16/586,528
Filing Date	09-27-2019
First Named Inventor	KOPELMAN; Avi
Art Unit	2128
Examiner Name	MAPAR, BIJAN
Attorney Docket Number	22773-822.303

NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
	003	ALEXANDER et al., "The DigiGraph Work Station Part 2 Clinical Management," JCO, pp. 402-407 (July 1990).	☐
	004	ALTSCHULER, "3D Mapping of Maxillo-Facial Prosthesis," AADR Abstract #607, 2 pages total, (1980).	☐
	005	ALTSCHULER et al., "Analysis of 3-D Data for Comparative 3-D Serial Growth Pattern Studies of Oral-Facial Structures, " IADR Abstracts, Program and Abstracts of Papers, 57th General Session, IADR Annual Session, March 29, 1979 - April 1, 1979, New Orleans Marriot, Journal of Dental Research, Vol. 58, January 1979, Special Issue A, p. 221.	☐
	006	ALTSCHULER et al., "Laser Electro-Optic System for Rapid Three-Dimensional (3D) Topographic Mapping of Surfaces," Optical Engineering, 20(6):953-961 (1981).	☐
	007	ALTSCHULER et al., "Measuring Surfaces Space-Coded by a Laser-Projected Dot Matrix," SPIE Imaging Applications for Automated Industrial Inspection and Assembly, Vol. 182, p. 187-191 (1979).	☐
	008	ANDERSSON et al., "Clinical Results with Titanium Crowns Fabricated with Machine Duplication and Spark Erosion," Acta. Odontol. Scand., 47:279-286 (1989).	☐
	009	ANDREWS, The Six Keys to Optimal Occlusion Straight Wire, Chapter 3, pp 13-24 (1989).	☐
	010	BARTELS, et al., An Introduction to Splines for Use in Computer Graphics and Geometric Modeling, Morgan Kaufmann Publishers, pp. 422-425 (1987).	☐

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	011	BAUMRIND, "A System for Craniofacial Mapping Through the Integration of Data from Stereo X-Ray Films and Stereo Photographs," an invited paper submitted to the 1975 American Society of Photogram Symposium on Close-Range Photogram Systems, University of Ill., Aug. 26-30, 1975, pp. 142-166.	☐
	012	BAUMRIND et al., "A Stereophotogrammetric System for the Detection of Prosthesis Loosening in Total Hip Arthroplasty," NATO Symposium on Applications of Human Biostereometrics," July 9-13, 1978, SPIE, Vol. 166, pp. 112-123.	☐
	013	BAUMRIND et al., "Mapping the Skull in 3-D," reprinted from J. Calif. Dent. Assoc., 48(2), 11 pages total, (1972 Fall Issue).	☐
	014	BAUMRIND, "Integrated Three-Dimensional Craniofacial Mapping: Background, Principles, and Perspectives," Semin. in Orthod., 7(4):223-232 (December 2001).	☐
	015	BEGOLE et al., "A Computer System for the Analysis of Dental Casts," The Angle Orthod., 51(3):253-259 (July 1981).	☐
	016	BERNARD et al.," Computerized Diagnosis in Orthodontics for Epidemiological Studies: A Progress Report," Abstract, J. Dental Res. Special Issue, Vol. 67, p. 169, paper presented at International Association for Dental Research 66th General Session, March 9-13, 1988, Montreal, Canada.	☐
	017	BHATIA et al., "A Computer-Aided Design for Orthognathic Surgery," Br. J. Oral Maxillofac. Surg., 22:237- 253 (1984).	☐
	018	BIGGERSTAFF, "Computerized Diagnostic Setups and Simulations," Angle Orthod., 40(1):28-36 (January 1970).	☐

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	019	BIGGERSTAFF et al., "Computerized Analysis of Occlusion in the Postcanine Dentition," Am. J. Orthod., 61(3): 245-254 (March 1972).	☐
	020	BIOSTAR OPEATION & TRAINING MANUAL. Great Lakes Orthodontics, Ltd. 199 Fire Tower Drive, Tonawanda, New York. 14150-5890, 20 pages total (1990).	☐
	021	BLU, et al., "Linear interpolation revitalized", IEEE Trans. Image Proc., 13(5):710-719 (May 2004.	☐
	022	BOURKE, "Coordinate System Transformation," (June 1996), p. 1, retrieved from the Internet 11/05/2004, URL < http://astronomy.swin.edu.au/—pbourke/prolection/coords > .	☐
	023	BOYD et al., "Three Dimensional Diagnosis and Orthodontic Treatment of Complex Malocclusions With the Invisalign Appliance," Semin. Orthod., 7(4):274-293 (December 2001).	☐
	024	BRANDESTINI et al., "Computer Machined Ceramic Inlays: In Vitro Marginal Adaptation," J. Dent. Res. Special Issue, Abstract 305, Vol. 64, p. 208 (1985).	☐
	025	BROOK et al., "An Image Analysis System for the Determination of Tooth Dimensions from Study Casts: Comparison with Manual Measurements of Mesio-distal Diameter," J. Dent. Res., 65(3):428-431 (March 1986).	☐
	026	BURSTONE et al., Precision Adjustment of the Transpalatal Lingual Arch: Computer Arch Form IN Predetermination, Am, Journal of Orthodontics, Vol. 79, No. 2 (Feb. 1981), pp. 115-133.	☐
	027	BURSTONE (interview), "Dr. Charles J. Burstone on The Uses of the Computer in Orthodontic Practice (Part 1)," J. Clin. Orthod., 13(7):442-453 (July 1979).	☐

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Art Unit	2128
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	028	BURSTONE (interview), "Dr. Charles J. Burstone on The Uses of the Computer in Orthodontic Practice (Part 2)," J. Clin. Orthod., 13(8):539-551 (August 1979).	☐
	029	Cardinal Industrial Finishes, Powder Coatings information posted at < http://www.cardinalpaint.com > on Aug. 25, 2000, 2 pages.	☐
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	033	CHAPUIS, et al. A New System for Computer-Aided Preoperative Planning and Intraoperative Navigation During Corrective Jaw Surgery. IEEE Trans Inf Technol Biomed 2007 May; 11(3) :274-287.	☐
	034	CHIAPPONE, (1980). Constructing the Gnathologic Setup and Positioner, J. Clin. Orthod, Vol. 14, pp. 121- 133.	☐
	035	COTTINGHAM, (1969). Gnathologic Clear Plastic Positioner, Am. J. Orthod, Vol. 55, pp. 23-31.	☐
	036	CRAWFORD, "CAD/CAM in the Dental Office: Does It Work?", Canadian Dental Journal, Vol. 57, No. 2, pp. 121-123 (February 1991).	☐

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	037	CRAWFORD, "Computers in Dentistry: Part 1 CAD/CAM: The Computer Moves Chairside," Part 2 F. Duret — A Man with a Vision," Part 3 The Computer Gives New Vision — Literally," Part 4 Bytes 'N Bites — The Computer Moves from the Front Desk to the Operatory," Canadian Dental Journal, Vol. 54 (9), pp. 661-666 (1988).	☐
	038	CROOKS, "CAD/CAM Comes to USC," USC Dentistry, pp. 14-17 (Spring 1990).	☐
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	040	CURRY et al., "Integrated Three-Dimensional Craniofacial Mapping at the Craniofacial Research Instrumentation Laboratory/University of the Pacific," Semin. Orthod., 7(4):258-265 (December 2001).	☐
	041	CUTTING et a/., "Three-Dimensional Computer-Assisted Design of Craniofacial Surgical Procedures: Optimization and Interaction with Cephalometric and CT-Based Models," Plast. 77(6):877-885 (June 1986).	☐
	042	DCS Dental AG, "The CAD/CAM 'DCS Titan System' for Production of Crowns/Bridges," DSC Production AG, pp. 1-7 (January 1992.	☐
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	044	DEFRANCO et al., "Three-Dimensional Large Displacement Analysis of Orthodontic Appliances," J. Biomechanics, 9:793-801 (1976).	☐

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	045	DENTAL INSTITUTE UNIVERSITY OF ZURICH SWITZERLAND, Program for International Symposium JD on Computer Restorations: State of the Art of the CEREC-Method, May 1991, 2 pages total.	☐
	046	DENTRAC CORPORATION, Dentrac document, pp. 4-13 (1992).	☐
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	048	DOYLE, "Digital Dentistry," Computer Graphics World, pp. 50-52, 54 (October 2000).	☐
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	051	DURET et al, "CAD-CAM in Dentistry," J. Am. Dent. Assoc. 117:715-720 (November 1988).	☐
	052	DURET, "The Dental CAD/CAM, General Description of the Project," Hennson International Product Brochure, 18 pages total, January 1986.	☐
	053	DURET,"Vers Une Prosthese Informatisee," (English translation attached), Tonus, Vol. 75, pp. 55-57 (November 15, 1985).	☒
	054	ECONOMIDES, "The Microcomputer in the Orthodontic Office," JCO, pp. 767-772 (November 1979).	☐
	055	ELSASSER, Some Observations on the History and Uses of the Kesling Positioner, Am. J. Orthod. (1950) 36:368-374.	☐

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	056	English translation of Japanese Laid-Open Publication No. 63-11148 to inventor T. Ozukuri (Laid-Open on January 18, 1998) pp. 1-7.	☐
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	064	GUESS et al., "Computer Treatment Estimates In Orthodontics and Orthognathic Surgery," JCO, pp. 262- 28 (April 1989).	☐

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 22 of 32

Complete if Known	
Application Number	16/586,528
Filing Date	09-27-2019
First Named Inventor	KOPELMAN; Avi
Art Unit	2128
Examiner Name	MAPAR, BIJAN
Attorney Docket Number	22773-822.303

NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
	065	HEAVEN et al., "Computer-Based Image Analysis of Artificial Root Surface Caries," Abstracts of Papers," J. Dent. Res., 70:528 (April 17-21, 1991).	☐
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	072	Institution Decision, 3SHAPE A/S v. ALIGN TECHNOLOGY, INC., IPR2019-00134, Paper No. 8, (P.T.A.B. July 22, 2019).	☐

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	073	International Search Report and Written Opinion dated 04/11/2014 for PCT/IL2011/000574. 10 pages.	☐
	074	JCO Interviews, "Craig Andreiko , DDS, MS on the Elan and Orthos Systems," JCO, pp. 459-468 (Aug. 1994).	☐
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	082	KESLING, Coordinating the Predetermined Pattern and Tooth Positioner with Conventional Treatment, KN Am. J. Orthod. Oral Surg. (1946) 32:285-293.	☐
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	089	LEINFELDER, et al., "A New Method for Generating Ceramic Restorations: a CAD-CAM System," J. Am. 1-1 Dent. Assoc., 118(6):703-707 (June 1989).	☐
	090	MANETTI, et al., "Computer-Aided Cefalometry and New Mechanics in Orthodontics," (Article Summary in English, article in German), Fortschr Kieferorthop. 44, 370-376 (Nr. 5), 1983.	☐

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	091	MCCANN, "Inside the ADA," J. Amer. Dent. Assoc., 118:286-294 (March 1989).	☐
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	100	PAUL et al., "Digital Documentation of Individual Human Jaw and Tooth Forms for Applications in Orthodontics, Oral Surgery and Forensic Medicine" Proc. of the 24th Annual Conf. of the IEEE Industrial Electronics Society (IECON '98), Sept. 4, 1998, pp. 2415-2418.	☐
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	107	REDMOND et al., "Clinical Implications of Digital Orthodontics," Am. J. Orthod. Dentofacial Orthop., 117(2):240-242 (2000).	☐

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	116	RICHMOND et al., "The Development of the PAR Index (Peer Assessment Rating): Reliability and Validity," Eur. J. Orthod., 14:125-139 (1992).	☐
	117	RICHMOND, "Recording The Dental Cast In Three Dimensions," Am. J. Orthod. Dentofacial Orthop., 92(3):199-206 (September 1987).	☐
	118	RUDGE, "Dental Arch Analysis: Arch Form, A Review of the Literature," Eur. J. Orthod., 3(4):279-284 1981.	☐
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	121	SCHROEDER et al., Eds. The Visual Toolkit, Prentice Hall PTR, New Jersey (1998) Chapters 6, 8 & 9, (pages 153-210,309-354, and 355-428, respectively.	☐
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	123	SIEMENS, "CEREC - Computer-Reconstruction," High Tech in der Zahnmedizin, 14 pages total (2004).	☐
	124	SINCLAIR, "The Readers' Corner," J. Clin. Orthod., 26(6):369-372 (June 1992).	☐

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Sheet 29 of 32

Complete if Known	
Application Number	16/586,528
Filing Date	09-27-2019
First Named Inventor	KOPELMAN; Avi
Art Unit	2128
Examiner Name	MAPAR, BIJAN
Attorney Docket Number	22773-822.303

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	125	SIRONA DENTAL SYSTEMS GmbH, CEREC 3D, Manuel utiiisateur, Version 2.0X (in French), 2003,114 pages total.	☐
	126	STOLL et al., "Computer-aided Technologies in Dentistry," (article summary in English, article in German), Dtsch Zahna'rztl Z 45, pp. 314-322 (1990).	☒
	127	STURMAN, "Interactive Keyframe Animation of 3-D Articulated Models," Proceedings Graphics Interface '84, May-June 1984, pp. 35-40.	☐
	128	The Choice Is Clear: Red, White & Blue ... The Simple, Affordable, No-Braces Treatment," Allesee Orthodontic Appliances-Pro Lab product information, 6 pages (2003).	☐
	129	The Choice Is Clear: Red, White & Blue ... The Simple, Affordable, No-Braces Treatment, Allesee HI Orthodontic Appliances-Pro Lab product information for doctors. http://ormco.com/aoa/appliancesservices/RWB/doctorhtml, 5 pages (May 19, 2003).	☐
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	134	U.S. Department of Commerce, National Technical Information Service, "Automated Crown Replication Using Solid Photography SM," Solid Photography Inc., Melville NY, October 1977, 20 pages total.	☐
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	143	WARUNEK et.al., Clinical Use of Silicone Elastomer Applicances, JCO (1989) XXIII(10):694-700.	☐
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	151	YAMAMOTO et al., "Three-Dimensional Measurement of Dental Cast Profiles and Its Applications to Orthodontics," Conf. Proc. IEEE Eng. Med. Biol. Soc., 12(5):2051-2053 (1990).	☐
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	155	YOSHII, "Research on a New Orthodontic Appliance: The Dynamic Positioner (D.P.); III. The General Concept of the D.P. Method and Its Therapeutic Effect, Part 1, Dental and Functional Reversed Occlusion Case Reports," Nippon Dental Review, 457:146-164 (November 1980).	☒
	156	YOSHII, "Research on a New Orthodontic Appliance: The Dynamic Positioner (D.P.); III.- The General Concept of the D.P. Method and Its Therapeutic Effect, Part 2. Skeletal Reversed Occlusion Case Reports," Nippon Dental Review, 458:112-129 (December 1980).	☒
	157	You May Be A Candidate For This Invisible No-Braces Treatment, Allesee Orthodontic Appliances-Pro Lab product information for patients, 2 pages (2002).	☐

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Filing Date:	27-Sep-2019
Title of Invention:	METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS
First Named Inventor/Applicant Name:	Avi Kopelman
Filer:	Charles C. Hagadorn III/John Macalagay
Attorney Docket Number:	22773-822.303
Filed as Large Entity	
Filing Fees for Utility under 35 USC 111(a)	

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Pages:				
Claims:				
Miscellaneous-Filing:				
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Extension-of-Time:				

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Miscellaneous:				
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Application Number:	16586528
International Application Number:	
Confirmation Number:	9600
Title of Invention:	METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS
First Named Inventor/Applicant Name:	Avi Kopelman
Customer Number:	107046
Filer:	Charles C. Hagadorn III/John Macalagay
Filer Authorized By:	Charles C. Hagadorn III
Attorney Docket Number:	22773-822.303
Receipt Date:	19-MAR-2020
Filing Date:	27-SEP-2019
Time Stamp:	13:18:05
Application Type:	Utility under 35 USC 111(a)

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30	Foreign Reference	WO9008512A1_EFS.PDF	800699 78f5e418aac741bbeaab89b0157857f77fded2d0	no	18
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31	Foreign Reference	WO9104713A1_EFS.PDF	691945 d60b0f9f5b1c4b492a737d0a4bcd535e39d82951	no	17
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32	Foreign Reference	WO9410935A1_EFS.PDF	6412376 b9cf6abecb7c99682c376ea7f7a3bbe6a753b039	no	137
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33	Foreign Reference	WO9832394A1_EFS.PDF	999278 ff439d961f153b091f41bad0d8e342ee9dd3b828	no	25
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34	Foreign Reference	WO9844865A1_EFS.PDF	1585620 ffcc4eab52fad82c2ed775847f73c7cc29a9bc10	no	38
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35	Foreign Reference	WO9858596A1_EFS.PDF	2381592 3a37598e1730c0e1087c5f8651b88d4d2f2fafae	no	62
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36		22773-822-303_IDS-1.pdf	975025 e0ffbe9da5ab27ba2a61326380ca1d79c6377be7	yes	36
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Transmittal Letter		1	4	
	Information Disclosure Statement (IDS) Form (SB08)		5	36	
Warnings:					
Information:					
37	Fee Worksheet (SB06)	fee-info.pdf	30639 d0677528f5ba54b7883b7bd3511198ca4fe7d98f	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	62380272		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

INTERNATIONAL SEARCH REPORT

Intern ıal Application No
PCT/US 98/12861

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A61C7/00

According to International Patent Classification(IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 A61C

Documentation searched other than minimumdocumentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 94 10935 A (ORMCO) 26 May 1994 see the whole document	1,7,19, 22,29,42
A	FR 2 369 828 A (HITO SUYEHIRO) 2 June 1978 see the whole document	1,2,7,8, 14

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of theinternational search	Date of mailing of the international search report
13 October 1998	20/10/1998

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Vanrunxt, J

1

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

...ormation on patent family members

Internal Application No
PCT/US 98/12861

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9410935 A	26-05-1994	US 5368478 A	29-11-1994
		US 5447432 A	05-09-1995
		US 5454717 A	03-10-1995
		US 5431562 A	11-07-1995
		AU 5598894 A	08-06-1994
		EP 0667753 A	23-08-1995
		JP 8508174 T	03-09-1996
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		US 5542842 A	06-08-1996
		US 5474448 A	12-12-1995
		US 5456600 A	10-10-1995
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		AU 517102 B	09-07-1981
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		GB 1550777 A	22-08-1979
		US 4504225 A	12-03-1985
		US 4505673 A	19-03-1985

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor:	KOPELMAN; Avi	Group Art Unit:	2128
Serial Number:	16/586,528	Examiner:	MAPAR, BIJAN
Filing or 371 (c) Date:	2019-09-27	**CONFIRMATION NO:**	**9600**
Title:	METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS		

FILED ELECTRONICALLY ON: March 19, 2020

Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

INFORMATION DISCLOSURE STATEMENT UNDER 37 CFR § 1.97

Commissioner for Patents:

An Information Disclosure Statement along with attached PTO/SB/08 is hereby submitted. A copy of each listed publication is submitted, if required, pursuant to 37 CFR §§1.97-1.98, as indicated below.

The Examiner is requested to review the information provided and to make the information of record in the above-identified application. The Examiner is further requested to initial and return the attached PTO/SB/08 in accordance with MPEP § 609.

The right to establish the patentability of the claimed invention over any of the information provided herewith, and/or to prove that this information may not be prior art, and/or to prove that this information may not be enabling for the teachings purportedly offered, is hereby reserved.

This statement is not intended to represent that a search has been made or that the information cited in the statement is, or is considered to be, prior art or material to patentability as defined in § 1.56.

A. ☐ *37 CFR § 1.97 (b).* This Information Disclosure Statement should be considered by the Office because:

☐ (1) It is being filed within 3 months of the filing date of a national application and is other than a continued prosecution application under § 1.53 (d);

-- OR --

☐ (2) It is being filed within 3 months of entry of the national stage as set forth in § 1.491 in an international application;

-- OR --

☐ (3) It is being filed before the mailing of a first Office action on the merits;

-- OR --

☐ (4) It is being filed before the mailing of a first Office action after the filing of a request for continued examination under § 1.114.

B. ☒ *37 CFR § 1.97(c).* Although this Information Disclosure Statement is being filed after the period specified in *37 CFR § 1.97(b),* above, it is filed before the mailing date of the earlier of (1) a final office action under § 1.113, (2) a notice of allowance under § 1.311, or (3) an action that otherwise closes prosecution in the application, this Information Disclosure Statement should be considered because it is accompanied by one of:

☐ a statement as specified in §1.97 (e) provided concurrently herewith;

-- OR --

☒ a fee of $240.00 as set forth in § 1.17 (p) authorized below, enclosed, or included with the payment of other papers filed together with this statement.

C. ☐ *37 CFR § 1.97 (d).* Although this Information Disclosure Statement is being filed after the mailing date of the earlier of (1) a final office action under § 1.113, (2) a notice of allowance under § 1.311, or (3) an action that otherwise closes prosecution in the application, it is being filed before payment of the issue fee and should be considered because it is accompanied by:

i. a statement as specified in § 1.97 (e);

-- AND --

ii. a fee of $240.00 as set forth in §1.17(p) is authorized below, enclosed, or included with the payment of other papers filed together with this Statement.

D. ☐ *37 CFR §1.97 (e).* Statement.

☐ A statement is provided herewith to satisfy the requirement under 37 CFR §§ 1.97 (c);

-- AND/OR --

☐ A statement is provided herewith to satisfy the requirement under 37 CFR §§ 1.97 (d);

-- AND/OR --

☐ A copy of a dated communication from a foreign patent office clearly showing that the information disclosure statement is being submitted within 3 months of the filing date on the communication is provided in lieu of a statement under 37 C.F.R. § 1.97(e) (1) as provided for under MPEP 609.04(b) V.

E. ☐ *Statement Under 37 C.F.R. §1.704(d).* Each item of information contained in the information disclosure statement was first cited in any communication from a patent office in a counterpart foreign or international application or from the Office or is a communication that was issued by a patent office in a counterpart foreign or international application or by the Office that was received by an individual designated in § 1.56(c) not more than thirty (30) days prior to the filing of this information disclosure statement. This statement is made pursuant to the requirements of 37 C.F.R. §1.704(d) to avoid reduction of the period of adjustment of the patent term for Applicant(s) delay.

F. ☒ *37 CFR §1.98 (a) (2).* The content of the Information Disclosure Statement is as follows:

☐ Copies of each of the references listed on the attached Form PTO/SB/08 are enclosed herewith.

-- OR --

☒ Copies of U.S. Patent Documents (issued patents and patent publications) listed on the attached Form PTO/SB/08 are not enclosed.

-- AND/OR --

☒ Copies of Foreign Patent Documents and/or Non Patent Literature Documents listed on the attached Form PTO/SB/08 are enclosed in accordance with 37 CFR §1.98 (a)(2).

-- AND/OR --

☒ Copies of pending unpublished U.S. patent applications are enclosed in accordance with 37 CFR §1.98 (a) (2) (iii).

G. ☒ *37 CFR §1.98(a)(3).* The Information Disclosure Statement includes non-English patents and/or references.

☐ Pursuant to 37 CFR §1.98(a)(3)(i), a concise explanation of the relevance of each patent, publication or other information provided that is not in English is provided herewith.

☐ Pursuant to MPEP 609(B), an English language copy of a foreign search report is submitted herewith to satisfy the requirement for a concise explanation where non-English language information is cited in the search report.

-- OR --

☐ A concise explanation of the relevance of each patent, publication or other information provided that is not in English is as follows: _____

☒ Pursuant to 37 CFR §1.98(a) (3) (ii), a copy of a translation, or a portion thereof, of the non-English language reference(s) is provided herewith.

H. ☐ *37 CFR §1.98(d).* Copies of patents, publications and pending U.S. patent applications, or other information specified in 37 C.F.R. § 1.98(a) are not provided herewith because:

☐ Pursuant to 37 CFR §1.98(d)(1) the information was previously submitted in an Information Disclosure Statement, or cited by examiner for another application under which this application claims priority for an earlier effective filing date under 35 U.S.C. 120.

Application in which the information was submitted: _____

Information Disclosure Statement(s) filed on: _____

AND

☐ The information disclosure statement submitted in the earlier application complied with paragraphs (a) through (c) of 37 CFR §1.98.

I. ☒ *Fee Authorization*. The Commissioner is hereby authorized to charge the above-referenced fees of $240.00 and charge any additional fees or credit any overpayment associated with this communication to Deposit Account No. 23-2415 (Docket No.22773-822.303).

Respectfully submitted,

WILSON SONSINI GOODRICH & ROSATI

Dated: March 18, 2020

By: /Charles Hagadorn III/
Charles Hagadorn III
Reg. No. 62,367

650 Page Mill Road
Palo Alto, CA 94304-1050
(650) 493-9300
Customer No. 107046

Electronic Acknowledgement Receipt	
EFS ID:	38912564
Application Number:	16586528
International Application Number:	
Confirmation Number:	9600
Title of Invention:	METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS
First Named Inventor/Applicant Name:	Avi Kopelman
Customer Number:	107046
Filer:	Charles C. Hagadorn III/John Macalagay
Filer Authorized By:	Charles C. Hagadorn III
Attorney Docket Number:	22773-822.303
Receipt Date:	19-MAR-2020
Filing Date:	27-SEP-2019
Time Stamp:	13:49:06
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Non Patent Literature	Z-AADR-SUMMARY-OF-1980.PDF	116242 74142fb5e9dedcfd8e32fd96b1922e7563eb79f4	no	1
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3	Non Patent Literature	Z-ALEXANDER-THE-DIGIGRAPH-402.PDF	1161788 a368a8f7e3265b9eac2aaca76337114b6ed3c4b9	no	12
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8	Non Patent Literature	Z-ANDERSSON-CLINICAL-RESULTS-279.PDF	978845 af9687c6369c20306b61c08e62eab0e8f3255c78	no	8
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9	Non Patent Literature	Z-ANDREWS-THE-SIX-13.PDF	1083046 657410bdf35e59019c25761ee46a3d24f281228e	no	13
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10	Non Patent Literature	Z-BARTELS-AN-INTRODUCTION-422.PDF	578863 7564e9ca2580b81440059772b18afd5583259111	no	7
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11	Non Patent Literature	Z-BAUMRIND-A-SYSTEM-142.PDF	2715329 4f3d187556a2ebdd61ea88b335bbcf9d3c6dbf15	no	25
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13	Non Patent Literature	Z-BAUMRIND-MAPPING-THE-1972.PDF	1777487 ccc658b3ebc42652ba42629bcdeef8ee32455612	no	11
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14	Non Patent Literature	Z-BAUMRIND-INTEGRATED-THREE-223.PDF	1305474 f1a3a6666d8e2948a6db87d9cb45f2dd675b71e6	no	10
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18	Non Patent Literature	Z-BIGGERSTAFF-COMPUTERIZED-DIAGNOSTIC-28.PDF	1299104 6901e04215f492f0ef25cb74e821aa7a53ec3195	no	10
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Information:					
26	Non Patent Literature	Z-BURSTONE-PRECISION-ADJUSTMENT-115.PDF	1216567 e627f089fc0b651f20174e45b399b3f57804586b	no	19
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28	Non Patent Literature	Z-BURSTONE-INTERVIEW-PART-2-539-1979.PDF	1114844 2b95aea15a805aa8b958ea88538a74273d263ec2	no	8
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29	Non Patent Literature	Z-CARDINAL-INDUSTRIAL-FINISHES-2000.PDF	276903 6d4725a1fa38c2c61a4f98d7f17cbe332af3b05b	no	6
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31	Non Patent Literature	Z-CHACONAS-THE-DIGIGRAPH-360.PDF	1333838 96e0cbadefc6b92c8912cf836db596882cfb9d08	no	20
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45	Non Patent Literature	Z-DENTAL-INSTITUTE-ZURICH-1991.PDF	185154 4667e1f51e4fcef8034fe19bf9220c98e9d560dd	no	2
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52	Non Patent Literature	Z-DURET-THE-DENTAL-1986.PDF	862652 873f19253903be1ddd79c9c204bdc9458ac94c54	no	18
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53	Non Patent Literature	Z-DURET-VERS-UNE-55.PDF	1239214 ebe195b0e9d6dc1c1a3a95336e483c31b9a53b8a	no	23
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56	Non Patent Literature	Z-ENGLISH-TRANSLATION-JP-63-11148.PDF	259914 1f8c7deb083f90e49a77d3e137ce7984eb14d9f9	no	7
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57	Non Patent Literature	Z-FELTON-A-COMPUTERIZED-478.PDF	468634 e38e392ecbb411961ef0ed4a3fecc401cc0e3428	no	7
Warnings:					
Information:					

58	Non Patent Literature	Z-FRIEDE-ACCURACY-OF-754.PDF	447138 0a39e815298652f3b6074da28b662258c7261cba	no	7
Warnings:					
Information:					
59	Non Patent Literature	Z-FUTTERLING-AUTOMATED-FINITE-1998.PDF	808611 cfcef8cf137c244786791c844e5d79d31c1b545d	no	8
Warnings:					
Information:					
60	Non Patent Literature	Z-GAO-3-D-ELEMENT-267.PDF	401591 bf9c9af79c95bb7f03d8a46229e9eb692d0f81e8	no	6
Warnings:					
Information:					
		Total Files Size (in bytes):	51371186		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

<u>New Applications Under 35 U.S.C. 111</u>
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
<u>National Stage of an International Application under 35 U.S.C. 371</u>
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
<u>New International Application Filed with the USPTO as a Receiving Office</u>
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
210635.1 DAB		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/IL2011/000574	19 July 2011 (19-07-2011)	19 July 2010 (19-07-2010)
Applicant		
CADENT LTD.		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 4 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language,** the international search was carried out on the basis of:
      [X] the international application in the language in which it was filed
      [ ] a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. [ ] This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. [ ] With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. [ ] **Certain claims were found unsearchable** (See Box No. II)

3. [ ] **Unity of invention is lacking** (see Box No III)

4. With regard to the **title,**
   [X] the text is approved as submitted by the applicant
   [ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**
   [X] the text is approved as submitted by the applicant
   [ ] the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings,**
   a. the figure of the **drawings** to be published with the abstract is Figure No. 1
      [ ] as suggested by the applicant
      [X] as selected by this Authority, because the applicant failed to suggest a figure
      [ ] as selected by this Authority, because this figure better characterizes the invention
   b. [ ] none of the figures is to be published with the abstract

INTERNATIONAL SEARCH REPORT

International application No
PCT/IL2011/000574

A. CLASSIFICATION OF SUBJECT MATTER
INV. G06T19/20 A61C13/00
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G06T A61C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, BIOSIS, COMPENDEX, INSPEC, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2010/114351 A1 (KOPELMAN AVI [US] ET AL) 6 May 2010 (2010-05-06) paragraph [0081] - paragraph [0087]; figures 5-7	1-104
Y	WO 2010/001401 A1 (CADENT LTD [IL]; KOPELMAN AVI [US]) 7 January 2010 (2010-01-07) page 25, line 21 - page 26, line 16; figure 5(b)	1-104

-/--

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
4 April 2014	11/04/2014

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Bouchaâla, Nicolas

1

INTERNATIONAL SEARCH REPORT

International application No
PCT/IL2011/000574

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JONAS CHAPUIS ET AL: "A New System for Computer-Aided Preoperative Planning and Intraoperative Navigation During Corrective Jaw Surgery", IEEE TRANSACTIONS ON INFORMATION TECHNOLOGY IN BIOMEDICINE, IEEE SERVICE CENTER, LOS ALAMITOS, CA, US, vol. 8, no. 3, May 2007 (2007-05), pages 274-287, XP011179985, ISSN: 1089-7771 sections II-A and II-B	1-104
A	WO 2009/146164 A1 (BIOMET 3I LLC [US]; BERCKMANS BRUCE III [US]; SUTTIN ZACHARY B [US]) 3 December 2009 (2009-12-03) paragraph [0054] - paragraph [0057]; figure 7A	1-104
A	EP 1 901 235 A1 (HONDA RES INST EUROPE GMBH [DE]) 19 March 2008 (2008-03-19) abstract	1-104

ClearCorrect Exhibit 1002, Page 177 of 437

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IL2011/000574

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2010114351 A1	06-05-2010	EP 1955226 A2	13-08-2008
		US 2007015111 A1	18-01-2007
		US 2008300716 A1	04-12-2008
		US 2010114351 A1	06-05-2010
		US 2012065952 A1	15-03-2012
		US 2013204601 A1	08-08-2013
		WO 2007010524 A2	25-01-2007
WO 2010001401 A1	07-01-2010	EP 2306928 A1	13-04-2011
		KR 20110039547 A	19-04-2011
		US 2010191510 A1	29-07-2010
		US 2014067337 A1	06-03-2014
		WO 2010001401 A1	07-01-2010
WO 2009146164 A1	03-12-2009	EP 2276417 A1	26-01-2011
		JP 2011517612 A	16-06-2011
		KR 20110013405 A	09-02-2011
		US 2011129792 A1	02-06-2011
		US 2014045143 A1	13-02-2014
		US 2014051038 A1	20-02-2014
		WO 2009146164 A1	03-12-2009
EP 1901235 A1	19-03-2008	EP 1901235 A1	19-03-2008
		JP 4852503 B2	11-01-2012
		JP 2008071355 A	27-03-2008
		US 2008068373 A1	20-03-2008

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/IL2011/000574	19.07.2011	19.07.2010

International Patent Classification (IPC) or both national classification and IPC
INV. G06T19/20 A61C13/00

Applicant
CADENT LTD.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notifed the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA:	Date of completion of this opinion	Authorized Officer
European Patent Office Gitschiner Str. 103 D-10958 Berlin Tel. +49 30 25901 - 0 Fax: +49 30 25901 - 840	see form PCT/ISA/210	Bouchaâla, Nicolas Telephone No. +49 30 25901-446

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:

   a. (means)

   ☐ on paper

   ☐ in electronic form

   b. (time)

   ☐ in the international application as filed

   ☐ together with the international application in electronic form

   ☐ subsequently to this Authority for the purposes of search

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-104
	No:	Claims	
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-104
Industrial applicability (IA)	Yes:	Claims	1-104
	No:	Claims	

2. Citations and explanations

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

1 Reference is made to the following documents cited in the search report:

D1 US 2010/114351 A1 6 May 2010 (2010-05-06)

D2 WO 2010/001401 A1 7 January 2010 (2010-01-07)

Re Item VIII.

2 **Clarity and conciseness**

2.1 The application does not meet the requirements of Article 6 PCT, because claims 21, 58, 93 are not clear. In fact, it is unclear why, in these claims, the replacement preparation surfaces of the second portions are claimed to be "inadequate for mounting the prosthesis thereto", considering that no positive technical effect may result from replacing something inadequate by something else which is also inadequate.

2.2 The claims 1 to 104 feature multiple redundancies, and could have been drafted in a more concise way in view of the subject-matter disclosed in the application as a whole. The claims therefore do not meet the requirement of conciseness of Article 6 PCT.

Re Item V

3 **Inventive Step**

The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1-104 does not involve an inventive step in the sense of Article 33(3) PCT, for the following reasons:

3.1 Document D1 discloses following features of independent **claim 1** (the differences to the claimed subject-matter are indicated by striking out):

a computer based method for modifying a virtual model of a physical structure,

(see D1, abstract)

comprising:
(A) displaying an image of said virtual model on a display operatively connected to a computer system;

(B) identifying at least a portion of said virtual model that is desired to be modified by interacting with the displayed image;

(see D1, paragraph [0084]: "In the next step 124, the areas of the first model part 510 that do not include a finish line are identified and optionally marked. This identification and marking may be done manually, by means of a display and interface";
see also figure 5, feature 515)

(C) modifying said virtual model by replacing in the computer system at least said portion of said virtual model with additional 3D data ~~obtained from the physical structure~~ to provide a modified virtual model.

(see D1, [0085]: " In any case, once the missing portions, herein generally designated as 515, are identified and optionally marked in a suitable with reference to the first model part 510, the next step 126 is to create 3-dimensional representations of the missing portions 515, i.e., a third model part."
see also [0086] and figure 7).

3.1.1 The subject-matter of claim 1 therefore differs from D1 in that:

- the additional 3D data is obtained from the physical structure,

and not by *"extrapolation"* like described in *D1, [0086]*.

3.1.2 Considering that it is recited in *D1, paragraph [0086]* that the additional *"missing"* data is created *"Based on the user's experience and skill"*, the objective problem solved by the characterizing feature of the invention consists in how to provide a reliable modified virtual model when the user is not experienced, or more generally in how to reduce the error rate in redefining the erroneous portions of the virtual model.

3.1.3 Two of the obvious solutions that a skilled person would straightforwardly envisage in order to solve these problems consist in a new measurement of the physical structure in total, or in a new measurement limited to the portion that is desired to be modified, followed by a replacement of this portion by the remeasured model portion . The latter would preferably be envisaged by the skilled person in particular in view of the disclosure of D2, which provides, in the same context than in the application, a method of stitching virtual model portions to a combined virtual model *(see D2, figure 5(b) and page 25, line 21*

to page 26, line 16), therefore allowing the practitioner to reduce the burden of remeasurement to a minimum. The skilled person would therefore arrive to a combination of all the features of claim 1 without having to resort to inventive skills.

3.1.4 Hence, the subject-matter of the **independent claim 1**, and of the corresponding **independent claims 28 and 30** in other claim-categories, is not involving an inventive step in the sense of Article 33(3) PCT.

3.2 The additional features of the **dependent claims 2-27, 29, 31, 32** concern details of implementation already described explicitly or implicitly in the passages of D1 or D2 cited in connection to claim 1 or in the search report. The subject-matter of these claims therefore also does not involve an inventive step in the sense of Article 33(3) PCT.

3.3 The **remaining claims 33-104** do not concern any combination of features that has not already been addressed above or any additional feature that is not described explicitly or implicitly in the passages of D1 or D2 recited above. The subject-matter of these claims therefore also does not involve an inventive step in the sense of Article 33(3) PCT.

4 Industrial applicability

The claims 1-104 relate to the technical field of medical virtual modelling, and are therefore considered as susceptible of industrial application (Article 33(4) PCT).

Electronic Acknowledgement Receipt	
EFS ID:	38913173
Application Number:	16586528
International Application Number:	
Confirmation Number:	9600
Title of Invention:	METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS
First Named Inventor/Applicant Name:	Avi Kopelman
Customer Number:	107046
Filer:	Charles C. Hagadorn III/John Macalagay
Filer Authorized By:	Charles C. Hagadorn III
Attorney Docket Number:	22773-822.303
Receipt Date:	19-MAR-2020
Filing Date:	27-SEP-2019
Time Stamp:	14:22:37
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Non Patent Literature	Z-GIM-ALLDENT-DAS-DUX-SYSTEM.PDF	130254 4adff5eccc16261cdd800bd53f2e9fa39fc81c56	no	2
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Information:					
2	Non Patent Literature	Z-GOTTLIEB-JCO-INTERVIEWS-390.PDF	1456775 f8c93557b086e3aee8785a8d5aa74ce5d4b37f4d	no	21
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Information:					
3	Non Patent Literature	Z-GRAYSON-NEW-METHODS-1990.PDF	417056 ea1bc1df1bdca491660fa5573423e1d1adc806b5	no	3
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Information:					
4	Non Patent Literature	Z-GUESS-COMPUTER-TREATMENT-262.PDF	1132027 27b5f0ebeb878777c564331c016739377a028175	no	11
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Information:					
5	Non Patent Literature	Z-HEAVEN-COMPUTER-BASED-17.PDF	796720 3f97abf36236ee767d29370a23b097478485e5cd	no	3
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6	Non Patent Literature	Z-HIGHBEAM-SIMULATING-STRESS-1996.PDF	140183 c10a4548ad43902dd7ffc898b642687a63b58e85	no	2
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7	Non Patent Literature	Z-HIKAGE-INTEGRATED-ORTHODONTIC-248.PDF	2799512 61fa540c68cfd9c5031e0ed68836b0b4d6c9fc06	no	56
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8	Non Patent Literature	Z-HOFFMAN-ROLE-OF-375.PDF	4616306 0097a93ab4ab42fa0f7da4eef39b837de6a59eee	no	23
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Information:					

9	Non Patent Literature	Z-HOJJATIE-THREE-DIMENSIONAL-1157.PDF	572590 e8e8f04e6191be80b820eb8222b0af8f0be0f269	no	10
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Information:					
10	Non Patent Literature	Z-HUCKINS-CAD-CAM-96.PDF	98055 3bc1b326bacd3b8def27813e0b6e7ec68648ce86	no	1
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Information:					
11	Non Patent Literature	Z-IMPORTANT-TIP-ABOUT-WEARING-1998.PDF	46522 340a2832fe869b21695cc4662c61b3a8fe5b3df6	no	1
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Information:					
12	Non Patent Literature	IPR2019-00134_US9299192B2-REQUEST_FOR_TRIAL_GRANTED_07-22-2019.PDF	1079731 4b362ca7724edf04d7d8c62387ba33ceb4350bae	no	26
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Information:					
13	Non Patent Literature	PCT-IL2011-000574_ISR-WO_11APR2014.PDF	335176 dba5204391e735b9099c965256361ed66b5de52e	no	10
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14	Non Patent Literature	Z-JCO-INTERVIEWS-459-1994.PDF	789378 eb8cc6cdb5a807d275aff43995351e05fb98a4e1	no	14
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15	Non Patent Literature	Z-JCO-INTERVIEWS-819-1983.PDF	1195122 24c006982a08e971fb69e1d665185d3c2c13c78f	no	19
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16	Non Patent Literature	Z-JERROLD-THE-PROBLEM-478.PDF	247348 213460c6855c8b07584675786249eb1a9d4b0cd5	no	5
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17	Non Patent Literature	Z-JONES-AN-ASSESSMENT-85.PDF	493613 e009d93ddc7c6e776651de4e4cef902144f91261	no	10
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Information:					
18	Non Patent Literature	Z-JP-FABER-COMPUTERIZED-INTERACTIVE-36.PDF	465810 139652252abf4b216de00c6d1ecdd548dd957a7e	no	6
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Information:					
19	Non Patent Literature	Z-KAMADA-CASE-REPORTS-11.PDF	642704 0333ab43190df705129d4b06e6d881f2b7caf4b0	no	20
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20	Non Patent Literature	Z-KAMADA-CONSTRUCTION-OF-1982.PDF	856658 d2851625384 1da77323d15300fbbc0565fb1d546	no	28
Warnings:					
Information:					
21	Non Patent Literature	Z-KANAZAWA-THREE-DIMENSIONAL-1298.PDF	473549 8b4e653af57a0fd53fcbd21c7fe33ee8e6069b71	no	6
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Information:					
22	Non Patent Literature	Z-KESLING-COORDINATING-THE-285.PDF	492258 1f1cc962bcf019aa013e6e360f14929f1bd5a46a	no	8
Warnings:					
Information:					

23	Non Patent Literature	Z-KESLING-THE-PHILOSOPHY-297.PDF	373829 fdcd21b043f3daf4df3d8cedf987333f939e5d0b	no	6
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24	Non Patent Literature	Z-KLEEMAN-THE-SPEED-673.PDF	920375 07b8b512ca1666a5c26df2826836b548a6dbe7b4	no	8
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Information:					
25	Non Patent Literature	Z-KOCHANEK-INTERPOLATING-SPLINES-33.PDF	640437 77af1aff1d1c0e24fc3d60e715ade91d42d635cd	no	9
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26	Non Patent Literature	Z-KUNII-ARTICULATION-SIMULATION-181.PDF	709919 8488f62405d5670e0ced1a36020caef1d84829d3	no	8
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28	Non Patent Literature	Z-LAURENDEAU-A-COMPUTER-VISION-453.PDF	499672 53462babf653afe4a83458868d556955110a44c2	no	9
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29	Non Patent Literature	Z-LEINFELDER-A-NEW-703.PDF	508063 e776fb6e5a7454cf74fb17ae7b1dcf95d3f82242	no	5
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30	Non Patent Literature	Z-MANETTI-COMPUTER-AIDED-370.PDF	1687370 6009829137fa3e27079c72fcfd94212ae7fd2a62	no	8
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31	Non Patent Literature	Z-MCCANN-INSIDE-THE-286.PDF	904121 f775a5baaaef6dd7aa3dd709e64ec5dba78cf946	no	9
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32	Non Patent Literature	Z-MCNAMARA-INVISIBLE-RETAINERS-570.PDF	407944 bf0ebc18a99eba68c8f15486195871316f41e3e7	no	11
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33	Non Patent Literature	Z-MCNAMARA-ORTHODONTIC-AND-347.PDF	3226062 3382eb655e5a3baf0e7255a107f6e0f6a771cd32	no	11
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34	Non Patent Literature	Z-MOERMANN-COMPUTER-MACHINED-763.PDF	189931 a77edf1e2d2d4662a93f444408103dd956b69997	no	1
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35	Non Patent Literature	Z-MOLES-CORRECTING-MILD-2002.PDF	548699 f7321a4804e8105aaea9d421ae311ecc5e9d37f6	no	2
Warnings:					
Information:					
36	Non Patent Literature	Z-MORMANN-MARGINALE-ADAPTION-1118.PDF	863951 360844e1504dc76f0ae34b2495b1cabc83a355a2	no	7
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37	Non Patent Literature	Z-NAHOUM-THE-VACUUM-385.PDF	939672 1775cb4ea30de6e0a90ae17fb8c658e539cd7cb6	no	6
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38	Non Patent Literature	Z-NASH-CEREC-CAD-22.PDF	768064 377dba4f0649b089bd258176f8727d2f7739fdfe	no	4
Warnings:					
Information:					
39	Non Patent Literature	Z-NISHIYAMA-A-NEW-93.PDF	333417 5365902a382260cdb332ff1d1306371daedbefa9	no	11
Warnings:					
Information:					
40	Non Patent Literature	Z-PAUL-DIGITAL-DOCUMENTATION-2415.PDF	331473 68c49e09b9b8bd681642f52084c19610e34e30af	no	5
Warnings:					
Information:					
41	Non Patent Literature	Z-PINKHAM-FOOLISH-CONCEPT-1989.PDF	319351 bd70ff64f1e8f99a127c469efb05c7ef4ff77587	no	3
Warnings:					
Information:					
42	Non Patent Literature	Z-PINKHAM-INVENTORS-CAD-1990.PDF	358948 63d0f3695636e91279b1a7fea3c5c9c66953da6f	no	3
Warnings:					
Information:					
43	Non Patent Literature	Z-PONITZ-INVISIBLE-RETAINERS-266.PDF	7027538 4b3bf2b405cc7aae25736077e374e897ec671345	no	7
Warnings:					
Information:					

44	Non Patent Literature	Z-PROCERA-RESEARCH-PROJECTS-1993.PDF	1374466 f8f711a24932ca9dc09f534844799f7b7c44f2c5	no	23
Warnings:					
Information:					
45	Non Patent Literature	Z-PROFFIT-CONTEMPORARY-ORTHODONTICS-470.PDF	7046676 55157d1ee9f6032eef11017014ecab95ac0977ab	no	66
Warnings:					
Information:					
46	Non Patent Literature	Z-RAINTREE-ESSIX-1997.PDF	202656 0bdad28f9217347ad4c948b6c6b5e12b97870f7e	no	7
Warnings:					
Information:					
47	Non Patent Literature	Z-REDMOND-CLINICAL-IMPLICATIONS-240.PDF	201923 a02546a8944f3785d3e9533064d32cefac20b4d2	no	3
Warnings:					
Information:					
48	Non Patent Literature	Z-REKOW-A-REVIEW-25.PDF	704188 85de7db6c599f36e43f29d216e5c93577ecef2aa	no	9
Warnings:					
Information:					
49	Non Patent Literature	Z-REKOW-CAD-CAM-287.PDF	616058 b05c2dfc6b543cdf4d571959747401203378f80f3	no	3
Warnings:					
Information:					
50	Non Patent Literature	Z-REKOW-COMPUTER-AIDED-512.PDF	206660 197c120e6676f898347e3324cc69293c7c1db83b	no	6
Warnings:					
Information:					

51	Non Patent Literature	Z-REKOW-DENTAL-CAD-43.PDF	1405103 415d80eeb9c022c3ff99c29b6b3f8b74961caf14	no	6
Warnings:					
Information:					
52	Non Patent Literature	Z-REKOW-CAD-CAM-314.PDF	417444 9412c95ee9d02032bb48964f6c9cd300ac146362	no	5
Warnings:					
Information:					
53	Non Patent Literature	Z-REKOW-COMPARISON-OF-344.PDF	137970 a2076efcb2bc05afff343e1174486be1d0d1b80e	no	2
Warnings:					
Information:					
54	Non Patent Literature	Z-REKOW-FEASIBILITY-OF-1988.PDF	8757565 7b6df8e204824f80669aa569ee3b77f112843588	no	250
Warnings:					
Information:					
55	Non Patent Literature	Z-RICHMOND-THE-DEVELOPMENT-53.PDF	280562 0d0cf72c40bfd84a161d8a907eb40832d7f25864	no	3
Warnings:					
Information:					
56	Non Patent Literature	Z-RICHMOND-THE-DEVELOPMENT-125.PDF	1601545 d360e217f62d960481f4e850bd9b8c6fcb929732	no	15
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Information:					
57	Non Patent Literature	Z-RICHMOND-RECORDING-THE-199.PDF	585444 3953b7732a14747952acf49e8d0958efa2f26474	no	8
Warnings:					
Information:					

58	Non Patent Literature	Z-RUDGE-DENTAL-ARCH-279.PDF	467984 e790b39ac8b0473a4bc59f453418f4fc24af1f7d	no	7
Warnings:					
Information:					
59	Non Patent Literature	Z-SAKUDA-INTEGRATED-INFORMATION-210.PDF	1275068 a50292226ce8970f4cbb53d30870e9141c68d6ea	no	20
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Information:					
60	Non Patent Literature	Z-SCHELLHAS-THREE-DIMENSIONAL-438.PDF	588239 dfe96034ed5128782e350df3db87ac1ce4b9ca9b	no	5
Warnings:					
Information:					
		Total Files Size (in bytes):	67236916		

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New Applications Under 35 U.S.C. 111
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If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
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Electronic Acknowledgement Receipt	
EFS ID:	38913806
Application Number:	16586528
International Application Number:	
Confirmation Number:	9600
Title of Invention:	METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS
First Named Inventor/Applicant Name:	Avi Kopelman
Customer Number:	107046
Filer:	Charles C. Hagadorn III/John Macalagay
Filer Authorized By:	Charles C. Hagadorn III
Attorney Docket Number:	22773-822.303
Receipt Date:	19-MAR-2020
Filing Date:	27-SEP-2019
Time Stamp:	14:38:30
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Non Patent Literature	Z-SCHROEDER-THE-VISUAL-1998.PDF	7795772 21380687ffa5a5c09f6e8037f36f1d5802d1eaa0	no	175
Warnings:					

Information:					
2	Non Patent Literature	Z-SHILLIDAY-MINIMIZING-FINISHING-596.PDF	411143 be0344b01889dc8f564aa86acd2cbd07af648f02	no	4
Warnings:					
Information:					
3	Non Patent Literature	Z-SIEMENS-CEREC-COMPUTER-RECONSTRUCTION.PDF	3574192 e472ed6e44c87d51674bdfa409e5437d028ec7c1	no	14
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Information:					
4	Non Patent Literature	Z-SINCLAIR-THE-READERS-369.PDF	243096 b017dbcb44ab9442f6e15575c9e43bc28324cf73	no	5
Warnings:					
Information:					
5	Non Patent Literature	Z-SIRONA-DENTAL-SYSTEMS-2003.PDF	2825521 8df072d0636415e2806ffaefc3324f6e8a1ce349	no	114
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6	Non Patent Literature	Z-STOLL-COMPUTER-AIDED-314.PDF	6480374 08633c44557ce0e8c7ac32812ee450960dc5c6bb	no	30
Warnings:					
Information:					
7	Non Patent Literature	Z-STURMAN-INTERACTIVE-KEYFRAME-35.PDF	495663 9fd20cb874bcf9ab8be147b0e592589a413dd795	no	7
Warnings:					
Information:					
8	Non Patent Literature	Z-THE-CHOICE-IS-CLEAR-6.PDF	567749 5fc8cffbc2687ce510a6e7ec67db27628fea515f	no	6
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Information:					

9	Non Patent Literature	Z-THE-CHOICE-IS-CLEAR-5.PDF	330691 defd6b280b567c3b6099aa6c60ea14d210976c6d	no	5
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Information:					
10	Non Patent Literature	Z-THE-CHOICE-IS-CLEAR-2.PDF	137879 12f4dc2b08184086ae95545b3c3380f9adb92205	no	2
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Information:					
11	Non Patent Literature	Z-THE-RED-WHITE-BLUE-1992.PDF	139057 fa6c6f7d3582d52d1c28071c22621a2b15dcbc2a	no	2
Warnings:					
Information:					
12	Non Patent Literature	Z-TRUAX-TRUAX-CLASP-1992.PDF	2719664 2affc07d8b897b4744e73f2a044dc0f19d373aef	no	9
Warnings:					
Information:					
13	Non Patent Literature	Z-TRU-TAIN-ORTHODONTIC-AND-DENTAL.PDF	1009705 3718715b4e2bf79720bd322034286929eb4eb975	no	16
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Information:					
14	Non Patent Literature	Z-USDC-AUTOMATED-CROWN-1977.PDF	3008645 beb6962fecc1c70e350022a2676587c9392985d2	no	19
Warnings:					
Information:					
15	Non Patent Literature	Z-USDC-HOLODONTOGRAPHY-AN-1973.PDF	8186194 bf90fded9eeba83c5ce6138a491b2c368e3cddf5	no	40
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16	Non Patent Literature	Z-US-60-050342.PDF	897223 7c1877b18c56e333ec3475cfe27ddaa0ee784bb8	no	27
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18	Non Patent Literature	Z-VAN-DER-LINDEN-THREE-DIMENSIONAL-1100.PDF	155031 f4d85bb4196beeabd511191ba64a2fa2a4ac5b86	no	1
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19	Non Patent Literature	Z-VAN-DER-ZEL-CERAMIC-FUSED-769.PDF	1276830 7522f9d9a38441a013377d7ba56e938ba79612d1	no	11
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20	Non Patent Literature	Z-VARADY-REVERSE-ENGINEERING-255.PDF	1570137 73d7ec72e6b62ea8db48c1d5f4f9b26fe3cb601f	no	29
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21	Non Patent Literature	Z-VERSTREKEN-AN-IMAGE-842.PDF	1322805 7f7d0595c67a335b6ca9dc2c871ab20794ff389e	no	13
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22	Non Patent Literature	Z-WARUNEK-PHYSICAL-AND-388.PDF	943639 431de9f6db9709162fb37fc090e1cc6493cd910b	no	21
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Information:					

23	Non Patent Literature	Z-WARUNEK-CLINICAL-USE-694.PDF	313628 ca8dd7b4329a0be5758f81247116ef7f28158a27	no	7
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24	Non Patent Literature	Z-WELLS-APPLICATION-OF-351.PDF	2933667 a97625d9a65a5bdedf10e0503cc54d5a4d3aba26	no	16
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25	Non Patent Literature	Z-WILLIAMS-DENTISTRY-AND-1987.PDF	344850 8e96c969daabd083f075232f818cfba0829631ec	no	4
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Information:					
26	Non Patent Literature	Z-WILLIAMS-THE-SWITZERLAND-50.PDF	527730 033443c911139a515af33600dd32eb33af6ce157	no	6
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Information:					
27	Non Patent Literature	Z-WISHAN-NEW-ADVANCES-1990.PDF	215881 2bd3a14cbaf87d5a2a93e154947b05dfbb34a87a	no	2
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Information:					
28	Non Patent Literature	Z-WSCG-THE-SIXTH-1998.PDF	349939 217ad22b574ec8a284400b259ecee682588a5fd4	no	7
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29	Non Patent Literature	Z-XIA-THREE-DIMENSIONAL-97.PDF	1347442 44ff709a0fafda66089e6b2ba1d553f14fa5928f	no	14
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Information:					

30	Non Patent Literature	Z-YAMAMOTO-OPTICAL-MEASUREMENT-119.PDF	860778 db7dea3432cb5e7d5146525736cbe865666293ba	no	13
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Information:					
31	Non Patent Literature	Z-YAMAMOTO-THREE-DIMENSIONAL-2051.PDF	141862 3e9b531f6cb290c7637cd08fef4c823f8947e20f	no	3
Warnings:					
Information:					
32	Non Patent Literature	Z-YAMANY-A-SYSTEM-563.PDF	353711 79db354c301430fba9975ee09f4ce5bab077264c	no	5
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33	Non Patent Literature	Z-YOSHII-RESEARCH-ON-61.PDF	1777919 be052d085be31f004e7a52d706308433f04b24f6	no	32
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34	Non Patent Literature	Z-YOSHII-RESEARCH-ON-107.PDF	2679043 66848209212e94529e9f37e4712009144506e7146	no	48
Warnings:					
Information:					
35	Non Patent Literature	Z-YOSHII-RESEARCH-ON-146.PDF	3206858 0d26f89b3a4a27b13a50beac3098f2a0ea16d886	no	43
Warnings:					
Information:					
36	Non Patent Literature	Z-YOSHII-RESEARCH-ON-112.PDF	2157229 8070485a9904375eb8961a5786e32f67cba6115f	no	40
Warnings:					
Information:					

37	Non Patent Literature	Z-YOU-MAY-BE-A-CANDIDATE.PDF	164196 7dce50f5fa113ccb979dfe5b8c32ad7fa1817cfe	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	61612860	

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Approved for use through 11/30/2020. OMB 0651-0031
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Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	16/586,528
Filing Date	09-27-2019
First Named Inventor	KOPELMAN; Avi
Art Unit	2128
Examiner Name	MAPAR, BIJAN
Attorney Docket Number	22773-822.303

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	001	US-20160171128	06-16-2016	KOPELMAN; Avi.	
	002	US-20190167113	06-06-2019	KOPELMAN; Avi.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]
	001	WO-2007084647-A2	07-26-2007	3M INNOVATIVE PROPERTIES CO [US]		☐

NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author(in CAPITAL LETTERS),title of the article(when appropriate), title of the item (book,magazine,journal,serial,symposium,catalog,etc.),date,page(s),volume-issue number(s),publisher, city and/or country where published.	T[2]
			☐

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached. This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

Electronic Patent Application Fee Transmittal	
Application Number:	16586528
Filing Date:	27-Sep-2019
Title of Invention:	METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS
First Named Inventor/Applicant Name:	Avi Kopelman
Filer:	Charles C. Hagadorn III/John Macalagay
Attorney Docket Number:	22773-822.303
Filed as Large Entity	
Filing Fees for Utility under 35 USC 111(a)	

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
SUBMISSION- INFORMATION DISCLOSURE STMT	1806	1	240	240
		Total in USD ($)		**240**

Electronic Acknowledgement Receipt	
EFS ID:	38914622
Application Number:	16586528
International Application Number:	
Confirmation Number:	9600
Title of Invention:	METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS
First Named Inventor/Applicant Name:	Avi Kopelman
Customer Number:	107046
Filer:	Charles C. Hagadorn III/John Macalagay
Filer Authorized By:	Charles C. Hagadorn III
Attorney Docket Number:	22773-822.303
Receipt Date:	19-MAR-2020
Filing Date:	27-SEP-2019
Time Stamp:	15:07:01
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$240
RAM confirmation Number	E20203IF07426232
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		22773-822-303_IDS-2.pdf	150135 590fcc530123651b43632e68553a3d42e44e8afa	yes	5
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Transmittal Letter		1	4	
	Information Disclosure Statement (IDS) Form (SB08)		5	5	
Warnings:					
Information:					
2	Foreign Reference	WO2007084647A2_EFS.PDF	4935070 b19b6922ad0ce6d14c677b65a2a74ec5d821f9da	no	97
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30639 1bb173cf5575efc2f0e7692514accb6d9eb18726	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	5115844		

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New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor:	KOPELMAN; Avi	Group Art Unit:	2128
Serial Number:	16/586,528	Examiner:	MAPAR, BIJAN
Filing or 371 (c) Date:	2019-09-27	**CONFIRMATION NO:**	**9600**
Title:	METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS		

FILED ELECTRONICALLY ON: March 19, 2020

Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

INFORMATION DISCLOSURE STATEMENT UNDER 37 CFR § 1.97

Commissioner for Patents:

An Information Disclosure Statement along with attached PTO/SB/08 is hereby submitted. A copy of each listed publication is submitted, if required, pursuant to 37 CFR §§1.97-1.98, as indicated below.

The Examiner is requested to review the information provided and to make the information of record in the above-identified application. The Examiner is further requested to initial and return the attached PTO/SB/08 in accordance with MPEP § 609.

The right to establish the patentability of the claimed invention over any of the information provided herewith, and/or to prove that this information may not be prior art, and/or to prove that this information may not be enabling for the teachings purportedly offered, is hereby reserved.

This statement is not intended to represent that a search has been made or that the information cited in the statement is, or is considered to be, prior art or material to patentability as defined in § 1.56.

A. ☐ *37 CFR § 1.97 (b).* This Information Disclosure Statement should be considered by the Office because:

☐ (1) It is being filed within 3 months of the filing date of a national application and is other than a continued prosecution application under § 1.53 (d);

-- OR --

☐ (2) It is being filed within 3 months of entry of the national stage as set forth in § 1.491 in an international application;

-- OR --

☐ (3) It is being filed before the mailing of a first Office action on the merits;

-- OR --

☐ (4) It is being filed before the mailing of a first Office action after the filing of a request for continued examination under § 1.114.

B. ☒ *37 CFR § 1.97(c).* Although this Information Disclosure Statement is being filed after the period specified in *37 CFR § 1.97(b),* above, it is filed before the mailing date of the earlier of (1) a final office action under § 1.113, (2) a notice of allowance under § 1.311, or (3) an action that otherwise closes prosecution in the application, this Information Disclosure Statement should be considered because it is accompanied by one of:

☐ a statement as specified in §1.97 (e) provided concurrently herewith;

-- OR --

☒ a fee of $240.00 as set forth in § 1.17 (p) authorized below, enclosed, or included with the payment of other papers filed together with this statement.

C. ☐ *37 CFR § 1.97 (d).* Although this Information Disclosure Statement is being filed after the mailing date of the earlier of (1) a final office action under § 1.113, (2) a notice of allowance under § 1.311, or (3) an action that otherwise closes prosecution in the application, it is being filed before payment of the issue fee and should be considered because it is accompanied by:

i. a statement as specified in § 1.97 (e);

-- AND --

ii. a fee of $240.00 as set forth in §1.17(p) is authorized below, enclosed, or included with the payment of other papers filed together with this Statement.

D. ☐ *37 CFR §1.97 (e).* Statement.

☐ A statement is provided herewith to satisfy the requirement under 37 CFR §§ 1.97 (c);

-- AND/OR --

☐ A statement is provided herewith to satisfy the requirement under 37 CFR §§ 1.97 (d);

-- AND/OR --

☐ A copy of a dated communication from a foreign patent office clearly showing that the information disclosure statement is being submitted within 3 months of the filing date on the communication is provided in lieu of a statement under 37 C.F.R. § 1.97(e) (1) as provided for under MPEP 609.04(b) V.

E. ☐ *Statement Under 37 C.F.R. §1.704(d).* Each item of information contained in the information disclosure statement was first cited in any communication from a patent office in a counterpart foreign or international application or from the Office or is a communication that was issued by a patent office in a counterpart foreign or international application or by the Office that was received by an individual designated in § 1.56(c) not more than thirty (30) days prior to the filing of this information disclosure statement. This statement is made pursuant to the requirements of 37 C.F.R. §1.704(d) to avoid reduction of the period of adjustment of the patent term for Applicant(s) delay.

F. ☒ *37 CFR §1.98 (a) (2).* The content of the Information Disclosure Statement is as follows:

☐ Copies of each of the references listed on the attached Form PTO/SB/08 are enclosed herewith.

-- OR --

☒ Copies of U.S. Patent Documents (issued patents and patent publications) listed on the attached Form PTO/SB/08 are not enclosed.

-- AND/OR --

☒ Copies of Foreign Patent Documents and/or Non Patent Literature Documents listed on the attached Form PTO/SB/08 are enclosed in accordance with 37 CFR §1.98 (a)(2).

-- AND/OR --

☐ Copies of pending unpublished U.S. patent applications are enclosed in accordance with 37 CFR §1.98 (a) (2) (iii).

G. ☐ *37 CFR §1.98(a)(3).* The Information Disclosure Statement includes non-English patents and/or references.

☐ Pursuant to 37 CFR §1.98(a)(3)(i), a concise explanation of the relevance of each patent, publication or other information provided that is not in English is provided herewith.

☐ Pursuant to MPEP 609(B), an English language copy of a foreign search report is submitted herewith to satisfy the requirement for a concise explanation where non-English language information is cited in the search report.

-- OR --

☐ A concise explanation of the relevance of each patent, publication or other information provided that is not in English is as follows: _____

☐ Pursuant to 37 CFR §1.98(a) (3) (ii), a copy of a translation, or a portion thereof, of the non-English language reference(s) is provided herewith.

H. ☐ *37 CFR §1.98(d).* Copies of patents, publications and pending U.S. patent applications, or other information specified in 37 C.F.R. § 1.98(a) are not provided herewith because:

☐ Pursuant to 37 CFR §1.98(d)(1) the information was previously submitted in an Information Disclosure Statement, or cited by examiner for another application under which this application claims priority for an earlier effective filing date under 35 U.S.C. 120.

Application in which the information was submitted: _____

Information Disclosure Statement(s) filed on: _____

AND

☐ The information disclosure statement submitted in the earlier application complied with paragraphs (a) through (c) of 37 CFR §1.98.

I. ☒ *Fee Authorization*. The Commissioner is hereby authorized to charge the above-referenced fees of $240.00 and charge any additional fees or credit any overpayment associated with this communication to Deposit Account No. 23-2415 (Docket No.22773-822.303).

Respectfully submitted,

WILSON SONSINI GOODRICH & ROSATI

Dated: March 18, 2020

By: /Charles Hagadorn III/
Charles Hagadorn III
Reg. No. 62,367

650 Page Mill Road
Palo Alto, CA 94304-1050
(650) 493-9300
Customer No. 107046

I hereby certify that this correspondence is being filed via EFS-Web with the United States Patent and Trademark Office on March 19, 2020

WILSON SONSINI GOODRICH & ROSATI

By: /Hillary Pratt/

Attorney Docket No.: 22773-822.303
Client Ref. No.: 7034.WO.US.C1.C2

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Confirmation No.: 9600
Avi Kopelman	
Application No.: 16/586,528	Examiner: Bijan Mapar
Filed: September 27, 2019	Art Unit: 2128
For: METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS	AMENDMENT
Customer No.: 107046	

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

In response to the Non-Final Office Action mailed February 21, 2020, please enter the following amendments and remarks.

Amendments to the Claims are reflected in the listing of claims beginning on page 2.

Remarks begin on page 7.

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

1. (Currently Amended) A system for scanning a patient's teeth for a dental procedure, the system comprising:

a hand-held intraoral scanner; and

a computer readable medium including instructions that when executed by a computer system, ~~causes~~ cause the computer system to:

receive first scan data of the patient's teeth from the hand-held intraoral scanner;

display, to a display, a model of the patient's teeth, wherein the model of the patient's teeth is based on the received first scan data of the patient's teeth;

receive user input defining a portion of the model to be removed;

remove, from the displayed model, [[the]]a removed surface portion of the model to be removed according to the user input;

receive second scan data of the patient's teeth from the hand-held intraoral scanner, the second scan data including surface data of a physically changed portion of the patient's intra-oral cavity;

replace at least a portion of the removed surface portion of the model using the received second scan data of the patient's teeth including surface data of a physically changed portion of the patient's intraoral cavity; and

output, to the display, the model of the patient's teeth with the portion of the removed surface portion replaced using the received second scan data.

2. (Currently Amended) The system of claim 1, wherein the hand-held intraoral scanner comprises a probing member with a sensing face, an illumination unit, a light focusing optics defining one or more focal planes forward the sensing face, and a translation mechanism for displacing the one or more focal ~~plane~~ planes relative to the sensing face.

3. (Currently Amended) The system of claim 2, wherein the system further comprises the computer system and the display; wherein the system further comprises a mouse or wherein the display comprises a touch screen display; and wherein the user input defining ~~portions~~ portion of the model to be removed is received by ~~from~~ the mouse or the touch screen display.

4. (Currently Amended) The system of claim 1, wherein the instructions to replace the at least the portion of the removed surface portion of the model using the received second scan data comprise instructions to register ~~the portion of the removed portion of the model is replaced with at least the portion of the received second scan data by registering~~ the received second scan data with the model.

5. (Original) The system of claim 4, wherein the received second scan data is registered with the model by aligning identifying data of the received second scan data with corresponding parts of the model.

6. (Currently Amended) The system of claim 5, wherein the instructions to replace the at least the portion of the removed surface portion of the model using the received second scan data comprise instructions to further stitch ~~the portion of the removed portion of the model is replaced with at least the portion of the received second scan data by further stitching~~ [[the]]a portion of the received second scan data with the model.

7. (Currently Amended) The system of claim 6, wherein the instructions to replace the at least the portion of the removed surface portion of the model using the received second scan data comprise instructions to further discard ~~the portion of the removed portion of the model is replaced with at least the portion of the received second scan data by further discarding~~ a remainder of the received second scan data, the remainder including the identifying surface data, after stitching the portion of the received second scan data with the model.

8. (Currently Amended) The system of claim 1, wherein the computer readable medium further includes instructions that when executed by the computer system,

causes the computer system to: mark, on the displayed model, the user input defined portion, after receiving the user input and before removing the removed surface portion of the model.

9. (Currently Amended) A method for scanning a patient's teeth for a dental procedure, the method comprising:

receiving first scan data of the patient's teeth from a hand-held intraoral scanner;

displaying, to a display, a model of the patient's teeth, wherein the model of the patient's teeth is based on the received first scan data of the patient's teeth;

receiving user input via the displayed model demarcating a portion of the model to be retained and a surface portion of the model to be replaced;

receiving second scan data of the patient's teeth from the hand-held intraoral scanner, the second scan data including surface data of a physically changed portion of the patient's intra-oral cavity;

replacing at least a portion of the surface portion of the model to be replaced according to the user input using at least a portion of the ~~received~~ second scan data of the patient's teeth including the physically changed portion; and

~~outputing~~outputting, to the display, the model of the patient's teeth with the at least the portion of the surface ~~removed~~ portion replaced using the ~~received~~ second scan data.

10. (Original) The method of claim 9, further comprising marking an area on the displayed model associated with the received user input.

11. (Currently Amended) The method of claim 9, wherein replacing the at least the portion of the surface portion of the model to be replaced according to the user input using at least the portion of the second scan data comprises registering the second scan data with the model by aligning identifying data of the second scan data with corresponding parts of the model.

12. (Currently Amended) The method of claim 11, wherein replacing the at least the portion of the surface portion of the model to be replaced according to the user input

using at least the portion of the second scan data further comprises stitching the at least the portion of the second scan data with the model.

13. (Currently Amended) The method of claim 12, wherein replacing the at least the portion of the surface portion of the model to be replaced according to the user input using the at least the portion of the second scan data further comprises discarding a remainder of the second scan data, including the identifying surface data, after stitching the at least the portion of the second [[3scan]]scan data with the model.

14. (Previously Presented) The method of claim 9, wherein the model of the patient's teeth comprises a tooth preparation having a finish line, wherein a portion of the finish line is obscured or distorted, and wherein the physical change results in the finish line not being obscured or distorted.

15. (Previously Presented) The method of claim 9, wherein the model of the patient's teeth comprises a tooth preparation that accurately represents a surface of a physical preparation of the patient, and wherein the method further comprises analyzing the tooth preparation of the model to determine whether the surface of the physical preparation is suitable for a dental prosthesis; and wherein the physical change is a physical modification of the surface of the physical preparation of the patient.

16. (Original) The method of claim 15, wherein the dental prosthesis comprises a dental crown and wherein the tooth preparation analysis comprises analysis of the model with respect to a virtual model of an opposing dentition of an opposite jaw to determine whether the tooth preparation would result in an inadequate structure for the dental crown.

17. (Currently Amended) A system for intraorally scanning a patient's teeth for a dental procedure, the system comprising:

a hand-held intraoral scanner; and

a computer readable medium including instructions that when executed by a computer system, ~~causes~~ cause the computer system to:

receive first scan data of the patient's teeth from the hand-held intraoral scanner;

display, to a display, a model of the patient's teeth, wherein the model of the patient's teeth is based on the received first scan data of the patient's teeth;

receive user input defining a portion of the model to be removed;

after receiving the user input, remove, from the displayed model, [[the]]a removed surface portion of the model to be removed according to the user input;

after removing the portion of the model, receive second scan data of the patient's teeth from the hand-held intraoral scanner;

register the second scan data with the model by aligning identifying data of the second scan data with corresponding parts of the model;

replace at least a portion of the removed surface portion of the model using at least a portion of the received second scan data of the patient's teeth;

discarding a remainder of the second scan data, including the identifying data, after registering the second scan data with the model; and

output, to the display, the model of the patient's teeth with the portion of the removed surface portion replaced using the received scan data.

18. (Currently Amended) The system of claim 17, wherein the hand-held intraoral scanner comprises a probing member with a sensing face, an illumination unit, a light focusing optics defining one or more focal planes forward the sensing face, and a translation mechanism for displacing the one or more focal ~~plane~~ planes relative to the sensing face.

19. (Currently Amended) The system of claim 18, wherein the system further comprises the computer system and the display; wherein the system further comprises a mouse or wherein the display comprises a touch screen display; and wherein the user input defining ~~portions~~ portion of the model to be removed is received by ~~from~~ the mouse or the touch screen display.

20. (Currently Amended) The system of claim 17, wherein the portion of the removed surface portion of the model is replaced using at least [[a]]the portion of the received second scan data by registering the second scan data with the model.

REMARKS

Upon entry of this amendment, claims 1-20 will be pending in the present application. Claims 1-4, 6-9, 11-13, and 17-20 have been amended. Support for the amendments can be found in the specification as originally filed. Accordingly, no new matter has been added. Reconsideration is respectfully requested.

Double Patenting

Claims 1-20 are provisionally rejected on the ground of nonstatutory double patenting as allegedly being unpatentable over claims 1-8 and 23-30 of copending Application No. 16/176,474.

The e-terminal disclaimer filed concurrently herewith overcomes the double patenting rejections and, accordingly, claims 1-8 and 23-30 are allowable. Accordingly, Applicant respectfully requests withdrawal of the nonstatutory obviousness-type double patenting rejection.

Allowable Subject Matter

The Applicant thanks the Examiner for the indication of allowable subject matter. Although the undersigned attorney agrees with the Examiner's conclusion that claims 1-20 are allowable, the undersigned attorney notes that the claims may be allowable for reasons other than those identified by the Examiner and does not concede that the Examiner's characterization of the terms of the claims and the prior art are correct.

CONCLUSION

In view of the foregoing, Applicant believes all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

Further, the Commissioner is hereby authorized to charge any additional fees or credit any overpayment in connection with this paper to Deposit Account No. 23-2415.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 206-883-2500.

Respectfully submitted,

Dated: March 19, 2020

/Charles Hagadorn, III/

Charles Hagadorn, III
Registration No. 62,367

WILSON SONSINI GOODRICH & ROSATI
650 Page Mill Road
Palo Alto, CA 94304-1050
Tel: 650-493-9300
Fax 650-493-6811

Electronic Acknowledgement Receipt	
EFS ID:	38918115
Application Number:	16586528
International Application Number:	
Confirmation Number:	9600
Title of Invention:	METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS
First Named Inventor/Applicant Name:	Avi Kopelman
Customer Number:	107046
Filer:	Charles C. Hagadorn III/Hillary Pratt
Filer Authorized By:	Charles C. Hagadorn III
Attorney Docket Number:	22773-822.303
Receipt Date:	19-MAR-2020
Filing Date:	27-SEP-2019
Time Stamp:	18:20:42
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		22773_822_303_Response.pdf	134198 581e2a8e80919a558fe09977db0d6e074505550c	yes	8

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
	Claims	2	6
	Applicant Arguments/Remarks Made in an Amendment	7	8
Warnings:			
Information:			
	Total Files Size (in bytes):	134198	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Doc Code: DIST.E.FILE **Document Description: Electronic Terminal Disclaimer - Filed**	PTO/SB/25 U.S. Patent and Trademark Office Department of Commerce

Electronic Petition Request	**TERMINAL DISCLAIMER TO OBVIATE A PROVISIONAL DOUBLE PATENTING REJECTION OVER A PENDING "REFERENCE" APPLICATION**
Application Number	16586528
Filing Date	27-Sep-2019
First Named Inventor	Avi Kopelman
Attorney Docket Number	22773-822.303
Title of Invention	METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS

☒ Filing of terminal disclaimer does not obviate requirement for response under 37 CFR 1.111 to outstanding Office Action

☒ This electronic Terminal Disclaimer is not being used for a Joint Research Agreement.

Owner	Percent Interest
ALIGN TECHNOLOGY, INC.	100%

The owner(s) of percent interest listed above in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of any patent granted on pending reference Application Number(s)

16176474 filed on 10/31/2018

as the term of any patent granted on said reference application may be shortened by any terminal disclaimer filed prior to the grant of any patent on the pending reference application. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and any patent granted on the reference application are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the owner does not disclaim the terminal part of any patent granted on the instant application that would extend to the expiration date of the full statutory term of any patent granted on said reference application, "as the term of any patent granted on said reference application may be shortened by any terminal disclaimer filed prior to the grant of any patent on the pending reference application," in the event that any such patent granted on the pending reference application: expires for failure to pay a maintenance fee, is held unenforceable, is found invalid by a court of competent jurisdiction, is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321, has all claims canceled by a reexamination certificate, is reissued, or is in any manner terminated prior to the expiration of its full statutory term as shortened by any terminal disclaimer filed prior to its grant.

◉ Terminal disclaimer fee under 37 CFR 1.20(d) is included with Electronic Terminal Disclaimer request.

○	I certify, in accordance with 37 CFR 1.4(d)(4), that the terminal disclaimer fee under 37 CFR 1.20(d) required for this terminal disclaimer has already been paid in the above-identified application.

Applicant claims the following fee status:

○ Small Entity

○ Micro Entity

◉ Regular Undiscounted

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

THIS PORTION MUST BE COMPLETED BY THE SIGNATORY OR SIGNATORIES

I certify, in accordance with 37 CFR 1.4(d)(4) that I am:

◉ An attorney or agent registered to practice before the Patent and Trademark Office who is of record in this application

Registration Number 62367

○ A sole inventor

○ A joint inventor; I certify that I am authorized to sign this submission on behalf of all of the inventors as evidenced by the power of attorney in the application

○ A joint inventor; all of whom are signing this request

Signature	/Charles Hagadorn, III/
Name	Charles Hagadorn, III

*Statement under 37 CFR 3.73(b) is required if terminal disclaimer is signed by the assignee (owner).
Form PTO/SB/96 may be used for making this certification. See MPEP § 324.

Electronic Patent Application Fee Transmittal

Application Number:	16586528
Filing Date:	27-Sep-2019
Title of Invention:	METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS
First Named Inventor/Applicant Name:	Avi Kopelman
Filer:	Charles C. Hagadorn III/Hillary Pratt
Attorney Docket Number:	22773-822.303

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
STATUTORY OR TERMINAL DISCLAIMER	1814	1	160	160
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		160

Doc Code: DISQ.E.FILE
Document Description: Electronic Terminal Disclaimer – Approved

Application No.: 16586528

Filing Date: 27-Sep-2019

Applicant/Patent under Reexamination: Kopelman

Electronic Terminal Disclaimer filed on March 19, 2020

☒ APPROVED

This patent is subject to a terminal disclaimer

☐ DISAPPROVED

Approved/Disapproved by: Electronic Terminal Disclaimer automatically approved by EFS-Web

U.S. Patent and Trademark Office

Electronic Acknowledgement Receipt	
EFS ID:	38918208
Application Number:	16586528
International Application Number:	
Confirmation Number:	9600
Title of Invention:	METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS
First Named Inventor/Applicant Name:	Avi Kopelman
Customer Number:	107046
Filer:	Charles C. Hagadorn III/Hillary Pratt
Filer Authorized By:	Charles C. Hagadorn III
Attorney Docket Number:	22773-822.303
Receipt Date:	19-MAR-2020
Filing Date:	27-SEP-2019
Time Stamp:	18:23:10
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$160
RAM confirmation Number	E20203II23079601
Deposit Account	232415
Authorized User	Hillary Pratt
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Terminal Disclaimer-Filed (Electronic)	eTerminal-Disclaimer.pdf	33967 b66e5ebee7cecdf11b97b98f95847820c719ef73	no	2
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30391 c2b4c68676e7f5a21c676ec306947e28877f6977	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	64358		

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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

I hereby certify that this correspondence is being filed via EFS-Web with the United States Patent and Trademark Office on March 24, 2020

WILSON SONSINI GOODRICH & ROSATI

By: /Hillary Pratt/

Attorney Docket No.: 22773-822.303
Client Ref. No.: 7034.WO.US.C1.C2

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Confirmation No. 9600
Avi Kopelman	
Application No.: 16/586,528	Examiner: Bijan Mapar
Filed: September 27, 2019	Art Unit: 2128
For: METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS	MISCELLANEOUS COMMUNICATION
Customer No. 107046	

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

Applicant hereby advises the Office of the existence of the below listed litigations and/or trial proceedings of Patent No. 9,299,192 in compliance with the Applicant's duty to disclose under 37 C.F.R. §§1.56 and 1.2 (see also MPEP §2001.06(c)).

Before the International Trade Commission, Investigation 337-TA-1144, Certain Dental and Orthodontic Scanners and Software, and before the Delaware District court, Docket No. 1:2017cv01646, Align Technology, Inc. v. 3Shape A/S et al. If at any point the Examiner would like to be provided with copies of any contents of any related proceeding, Applicant will readily provide such copies upon request.

Before the Patent Trial and Appeal Board, IPR2019-00134. It is our understanding that the Examiner has access to and has considered the contents these Inter-Parties Reviews and that, accordingly,

additional documentation from these proceedings should not be submitted in the present examination. If this understanding is incorrect, Patent Owner respectfully requests notification. If at any point the Examiner would like to be provided with copies of any contents of any related proceeding, Patent Owner will readily provide such copies upon request.

Applicant hereby further advises the Office of co-pending applications in compliance with the Applicant's duty to disclose under 37 C.F.R. §§1.56 and 1.2 (see also MPEP §2001.06(b)) as discussed in McKesson Info. Soln. Inc., v. Bridge Medical Inc., 487 F.3d 897; 82 USPQ2d 1865 (Fed. Cir. 2007) including Appl. Nos. 15/050,673 and 16/176,474.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 206-883-2500.

Respectfully submitted,

Dated: March 24, 2020

/Charles Hagadorn, III/

Charles Hagadorn, III
Registration No. 62,367

WILSON SONSINI GOODRICH & ROSATI
650 Page Mill Road
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Electronic Acknowledgement Receipt	
EFS ID:	38958384
Application Number:	16586528
International Application Number:	
Confirmation Number:	9600
Title of Invention:	METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS
First Named Inventor/Applicant Name:	Avi Kopelman
Customer Number:	107046
Filer:	Charles C. Hagadorn III/Hillary Pratt
Filer Authorized By:	Charles C. Hagadorn III
Attorney Docket Number:	22773-822.303
Receipt Date:	24-MAR-2020
Filing Date:	27-SEP-2019
Time Stamp:	19:42:21
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Miscellaneous Incoming Letter	22773_822_303_MiscComm.pdf	105593 892388af7826b938f7e793ef643e16e0814b7faf	no	2
Warnings:					

Information:	
Total Files Size (in bytes):	105593

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

107046 7590 04/08/2020
WSGR / Align Technology , Inc.
650 Page Mill Road
Palo Alto, CA 94304

EXAMINER
MAPAR, BIJAN

ART UNIT	PAPER NUMBER
2128	

DATE MAILED: 04/08/2020

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/586,528	09/27/2019	Avi Kopelman	22773-822.303	9600

TITLE OF INVENTION: METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1000	$0.00	$0.00	$1000	07/08/2020

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PTOL-85 (Rev. 02/11)

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

107046 7590 04/08/2020
WSGR / Align Technology , Inc.
650 Page Mill Road
Palo Alto, CA 94304

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

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16/586,528	09/27/2019	Avi Kopelman	22773-822.303	9600

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nonprovisional	UNDISCOUNTED	$1000	$0.00	$0.00	$1000	07/08/2020

EXAMINER	ART UNIT	CLASS-SUBCLASS
MAPAR, BIJAN	2128	703-001000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑Issue Fee ❑Publication Fee (if required) ❑Advance Order - # of Copies _____

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via EFS-Web ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

❑ Applicant asserting small entity status. See 37 CFR 1.27

❑ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

ClearCorrect Exhibit 1002, Page 234 of 437

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

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Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

PTOL-85 (Rev. 02/11)

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	**Application No.** 16/586,528	**Applicant(s)** Kopelman, Avi	
	Examiner BIJAN MAPAR	**Art Unit** 2128	**AIA (FITF) Status** No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to the amendment and terminal disclaimer filed 3/19/2020.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are 1-20 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☑ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 3/19/2020a, 3/19/2020b.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☑ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/BIJAN MAPAR/
Primary Examiner, Art Unit 2128

DETAILED ACTION

Notice of Pre-AIA or AIA Status

The present application is being examined under the pre-AIA first to invent provisions.

Terminal Disclaimer

The terminal disclaimer filed 3/19/2020 is acknowledged, and is sufficient to overcome the previously made double patenting rejections.

Allowable Subject Matter

Claims 1-20 are allowed.

The following is an examiner's statement of reasons for allowance:

The claims are in effect equivalent to those recited in application 16/176,474 (subject of the newly filed terminal disclaimer), which was also indicated allowable. The reasoning set forth in that application applies equally to this application:

The claims as recited distinguish over the art of record, and the art as a whole via reciting the updating scans to be directed to scenarios where the intra-oral cavity (e.g. dentition) is modified in between the scans (e.g. subjected to a surface preparation). This distinguishes over the cited references (WIPO publication WO 2007084647 A2 and US Pre-Grant Publications 20070172112, 20020006217, 20070236494, and 20050283065), which deal only with recapturing scans of a static intra-oral region. The scanning methodology disclosed by the closest prior art, the Kriveshko WIPO reference (WO 2007084647 A2), does not provide for (or suggest) generating a composite scan after intra-oral modifications are made. Rather, it teaches away from this, teaching that entirely new scans should be made.

In ¶121-122, the Kriveshko WIPO reference (WO 2007084647 A2) describes an iterative approach to managing a preparation where "a dentist may repeat steps of tooth removal and scanning until a satisfactory surface preparation is achieved." This has an important distinction from the instant applications' claims, which provide a composite scan based on both a first (initial) and second (post-change) scan. In the Kriveshko references new scan is being gathered each time a preparation is made. The user interface allows for rescanning areas that are subject to errors, equivalent to modifying the first scan with data, but does not disclose that this can be done while the intra-oral region is modified (e.g. via a surface preparation). Rather, the rescanning is done to correct errors with the first scan, and the iterative process disclosed by the reference involves complete rescans (generating an entirely new scan rather than generating a composite scan by using a second scan to update the changed region from the first). See for example the Kriveshko WIPO reference at ¶119, where it discusses the interface used in this process: "The user interface may be adapted for use by a dentist (or dental laboratory) to review a surface preparation... in this mode, new data is not being acquired. Rather, a stored model may be processed." This explicitly teaches away from the claimed process, which data is newly captured and composited to update for the intra-oral modification.

In view of the above, with the Kriveshko WIPO reference representing the closest prior art, the claims distinguish over the art as a whole. The claims further recite eligible subject matter under 35 USC 101, as under the most recent guidance (2019 PEG) they are not directed to a judicial exception.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BIJAN MAPAR whose telephone number is (571)270-3674. The examiner can normally be reached on Monday - Thursday, 11:00-8:30.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Omar F Fernandez Rivas can be reached on 5712722589. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see https://ppair-my.uspto.gov/pair/PrivatePair. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/BIJAN MAPAR/
Primary Examiner, Art Unit 2128

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/586,528	Kopelman, Avi
	Examiner	Art Unit
	BIJAN MAPAR	2128

CPC						
Symbol					Type	Version
A61B	/	5	/	0088	F	2013-01-01
A61C	/	5	/	77	I	2017-02-01
G06T	/	19	/	20	I	2013-01-01
A61C	/	13	/	0004	I	2013-01-01
A61C	/	7	/	002	I	2013-01-01
G06F	/	30	/	00	I	2020-01-01
G06T	/	19	/	00	I	2013-01-01
G06T	/	7	/	0012	I	2013-01-01
A61B	/	5	/	0062	I	2013-01-01
A61B	/	5	/	4547	I	2013-01-01
A61C	/	9	/	0053	I	2013-01-01
B33Y	/	80	/	00	A	2014-12-01
G16H	/	20	/	40	A	2018-01-01
G06T	/	2210	/	41	A	2013-01-01
G06T	/	2219	/	2021	A	2013-01-01
G06T	/	2200	/	04	A	2013-01-01
G06T	/	2207	/	30036	A	2013-01-01
G06T	/	2219	/	2004	A	2013-01-01
A61B	/	1	/	00039	A	2013-01-01
A61B	/	1	/	00172	A	2013-01-01
A61C	/	19	/	04	A	2013-01-01

CPC Combination Sets							
Symbol					Type	Set	Ranking	Version
	/		/					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	20	
/BIJAN MAPAR/ Primary Examiner, Art Unit 2128	29 March 2020	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	6

U.S. Patent and Trademark Office — Part of Paper No.: 20200330

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Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/586,528	Kopelman, Avi
	Examiner	Art Unit
	BIJAN MAPAR	2128

INTERNATIONAL CLASSIFICATION				
CLAIMED				
G06T19/20	/	19	/	20
A61C7/00	/	7	/	00
G06F30/00	/	30	/	00
G06T19/00	/	19	/	00
G06T7/00	/	7	/	00

NON-CLAIMED				
A61B5/00	/	5	/	00
A61C5/77	/	5	/	77
A61C13/00	/	13	/	00
A61C9/00	/	9	/	00
B33Y80/00	/	80	/	00
G16H20/40	/	20	/	40
A61B1/00	/	1	/	00
A61C19/04	/	19	/	04

US ORIGINAL CLASSIFICATION	
CLASS	SUBCLASS
703	1

CROSS REFERENCES(S)						
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	20	
/BIJAN MAPAR/ Primary Examiner, Art Unit 2128	29 March 2020	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	6

U.S. Patent and Trademark Office — Part of Paper No.: 20200330

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Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
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	Examiner	Art Unit
	BIJAN MAPAR	2128

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	10	10	19	19										
2	2	11	11	20	20										
3	3	12	12												
4	4	13	13												
5	5	14	14												
6	6	15	15												
7	7	16	16												
8	8	17	17												
9	9	18	18												

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	20	
/BIJAN MAPAR/ Primary Examiner, Art Unit 2128	29 March 2020	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	6

U.S. Patent and Trademark Office — Part of Paper No.: 20200330

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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/586,528	Kopelman, Avi
	Examiner	Art Unit
	BIJAN MAPAR	2128

CPC - Searched*		
Symbol	Date	Examiner

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
Searched EAST for prior art (see query)	02/18/2020	Bijan Mapar
inventor search in PALM	02/18/2020	Bijan Mapar
partial search of CPC G06F17/50, G06T19/20, G06T7/0012, A61C7/002	02/18/2020	Bijan Mapar
Assignee search in EAST	02/18/2020	Bijan Mapar
IPR2019-00134 Reviewed Petition for Inter Partes Review of U.S. Patent No. 9,299,192	02/18/2020	Bijan Mapar
updated EAST search (see query)	03/29/2020	Bijan Mapar
reviewed references from two IDS dated 3/19/2020 (see 1449)	03/29/2020	Bijan Mapar

/BIJAN MAPAR/ Primary Examiner, Art Unit 2128	

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/586,528	Kopelman, Avi
	Examiner	Art Unit
	BIJAN MAPAR	2128

Interference Search			
US Class/CPC Symbol	**US Subclass/CPC Group**	**Date**	**Examiner**
A61	C7/002 (keyword limited)	03/29/2020	Bijan Mapar
G06	F30/00 (keyword limited)	03/29/2020	Bijan Mapar
G06	T19/20 (keyword limited)	03/29/2020	Bijan Mapar
G06	T7/0012 (keyword limited)	03/29/2020	Bijan Mapar
	keyword search (see query)	03/29/2020	Bijan Mapar

/BIJAN MAPAR/ Primary Examiner, Art Unit 2128	

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(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	16/586,528
Filing Date	09-27-2019
First Named Inventor	KOPELMAN; Avi
Art Unit	2128
Examiner Name	MAPAR, BIJAN
Attorney Docket Number	22773-822.303

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number / Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	001	US-20160171128	06-16-2016	KOPELMAN; Avi.	
	002	US-20190167113	06-06-2019	KOPELMAN; Avi.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document / Country Code[3]-Number[4]-Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]
	001	WO-2007084647-A2	07-26-2007	3M INNOVATIVE PROPERTIES CO [US]		☐

NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author(in CAPITAL LETTERS),title of the article(when appropriate), title of the item (book,magazine,journal,serial,symposium,catalog,etc.),date,page(s),volume-issue number(s),publisher, city and/or country where published.	T[2]
			☐

Examiner Signature	/BIJAN MAPAR/	Date Considered	03/29/2020

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached. This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.M/

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
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L2	3	"7476100".pn. or "7347686".pn. or "20030215764".pn.	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:23
L3	3	"20060263738".pn. or "20040029078".pn. or "20030215764".pn.	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:23
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L8	467	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remove or replace or modify) with (model or image)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:23
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L11	760	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or modif$8) with (model or image) and surface and (obscur$5 or block$4 or occlude$4)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:23
L12	322	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:23

		(3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or modif$8) with (model or image) and surface same (obscur$5 or block$4 or occlude$4)				
L13	219	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or modif$8) with (model or image) and surface same (obscur$5 or block$4 or occlude$4) and cavity	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:23
L14	0	(G06F17/50.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:23
L15	96	(G06T19/20.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:23
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L17	409	(A61C7/002.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:23
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L21	93	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and finish adj line	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:23
L22	14	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:23

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L31	1033	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or modif$8) with (model or image)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:23
L32	990	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or modif$8) with (model or image) and surface	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:24
L33	760	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or modif$8) with (model or image) and surface and (obscur$5 or block$4 or occlude$4)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:24
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L35	219	(dental or dentition or oral or intra-oral) with	US-	OR	OFF	2020/03/29

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L53	3	"20060263738".pn. or "20040029078".pn. or "20030215764".pn.	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:24
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L56	1	"20020006217".pn.	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:24
L57	1676	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:24
L58	467	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remove or replace or modify) with (model or image)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:24
L59	1033	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or modif$8) with (model or image)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:24
L60	990	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or modif$8) with (model or image) and surface	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:25
L61	760	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or modif$8) with (model or image) and surface and (obscur$5 or block$4 or occlude$4)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:25
L62	322	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or modif$8) with (model or image) and surface same (obscur$5 or block$4 or occlude$4)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:25
L63	219	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or modif$8) with (model or image) and surface same (obscur$5 or	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:25

		block$4 or occlude$4) and cavity				
L64	0	(G06F17/50.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:25
L65	96	(G06T19/20.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:25
L66	113	(G06T7/0012.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:25
L67	409	(A61C7/002.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:25
L68	1174	"align technology".as. or "align technology".aanm.	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:25
L69	923	"align technology".as. or "align technology".aanm. and (scan or image) with (composit$4 or combin$6 or regist$6)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:25
L70	885	"align technology".as. or "align technology".aanm. and (scan or image) with (composit$4 or combin$6 or regist$6) and (remov$3 or replac$3 or modif$8) with (model or image)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:25
L71	93	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and finish adj line	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:25
L72	14	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and finish adj line and @PD<"20100719"	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:25
L73	1	"15050673".apnr.	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:25
L74	3	"7476100".pn. or "7347686".pn. or "20030215764".pn.	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:25
L75	3	"20060263738".pn. or "20040029078".pn. or "20030215764".pn.	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:25

L76	168	("20020006597" | "20030009252" | "20030139834" | "20030224311" | "20040128010" | "20050055118" | "20100114351" | "20130110469" | "2467432" | "3407500" | "3600500" | "3600808" | "3660900" | "3683502" | "3738005" | "3860803" | "3916526" | "3922786" | "3950851" | "3983628" | "4014096" | "4195046" | "4253828" | "4324546" | "4324547" | "4348178" | "4478580" | "4500294" | "4504225" | "4505673" | "4526540" | "4575330" | "4575805" | "4591341" | "4609349" | "4611288" | "4656860" | "4663720" | "4664626" | "4676747" | "4742464" | "4755139" | "4763791" | "4793803" | "4798534" | "4836778" | "4837732" | "4850864" | "4850865" | "4856991" | "4877398" | "4880380" | "4889238" | "4890608" | "4935635" | "4936862" | "4937928" | "4941826" | "4964770" | "4975052" | "4983334" | "5011405" | "5017133" | "5027281" | "5035613" | "5055039" | "5059118" | "5100316" | "5121333" | "5125832" | "5128870" | "5130064" | "5131843" | "5131844" | "5139419" | "5142364" | "5145364" | "5176517" | "5184306" | "5186623" | "5257203" | "5273429" | "5278756" | "5328362" | "5338198" | "5340309" | "5342202" | "5368478" | "5382164" | "5395238" | "5431562" | "5440326" | "5440496" | "5447432" | "5452219" | "5454717" | "5456600" | "5474448" | "5518397" | "5528735" | "5533895" | "5542842" | "5549476" | "5562448" | "5587912" | "5605459" | "5607305" | "5614075" | "5621648" | "5645420" | "5645421" | "5655653" | "5683243" | "5692894" | "5725376" | "5725378" | "5733126" | "5740267" | "5742700" | "5748115" | "5799100" | "5800174" | "5823778" | "5848115" | "5857853" | "5866058" | "5879158" | "5880961" | "5880962" | "5934288" | "5957686" | "5964587" | "5971754" | "5975893" | "6015289" | "6044309" | "6049743" | "6062861" | "6068482" | "6099314" | "6123544" | "6152731" | "6183248" | "6190165" | "6217325" | "6217334" | "6244861" | "6309215" | "6315553" | "6322359" | "6334853" | "6350120" | "6382975" | "6398548" | "6402707" | "6482298" | "6524101" | "6554611" | "6572372" | "6629840" | "6705863" | "6722880" | "6739869" | "7347686" | "7476100" | "7536234" | "9299192" | "RE35169").PN.	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:25
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L79	1676	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:25
L80	467	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remove or replace or modify) with (model or image)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:25
L81	1033	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or modif$8) with (model or image)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:25
L82	990	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or modif$8) with (model or image) and surface	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:25
L83	760	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or modif$8) with (model or image) and surface and (obscur$5 or block$4 or occlude$4)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:26
L84	322	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or modif$8) with (model or image) and surface same (obscur$5 or block$4 or occlude$4)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:26
L85	219	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and (remov$3 or replac$3 or modif$8) with (model or image) and surface same (obscur$5 or block$4 or occlude$4) and cavity	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:26
L86	0	(G06F17/50.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:26

L87	96	(G06T19/20.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:26
L88	113	(G06T7/0012.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:26
L89	409	(A61C7/002.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:26
L90	1174	"align technology".as. or "align technology".aanm.	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:26
L91	923	"align technology".as. or "align technology".aanm. and (scan or image) with (composit$4 or combin$6 or regist$6)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:26
L92	885	"align technology".as. or "align technology".aanm. and (scan or image) with (composit$4 or combin$6 or regist$6) and (remov$3 or replac$3 or modif$8) with (model or image)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:26
L93	93	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and finish adj line	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:26
L94	14	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and finish adj line and @PD<"20100719"	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:26
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L102	10	(G06F30/20.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:41

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp

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L46	0	(G06F17/50.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:24
L47	96	(G06T19/20.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:24
L48	113	(G06T7/0012.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:24
L49	14	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and finish adj line and @PD<"20100719"	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:24
L50	93	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and finish adj line	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:24
L95	409	(A61C7/002.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:26
L96	0	(G06F17/50.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:26
L97	96	(G06T19/20.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:26
L98	113	(G06T7/0012.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:26

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L100	93	(dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model) and finish adj line	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:26
L103	97	(G06F30/00.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:41
L104	10	(G06F30/20.cpc.) and (dental or dentition or oral or intra-oral) with model$5 and (scan or image) with (composit$4 or combin$6 or regist$6) and (3D or 3-D or 3-dimensional or three-D or three-dimensional or (three adj dimensional)) same (scan or image or model)	US-PGPUB; USPAT	OR	OFF	2020/03/29 22:41

3/29/2020 10:42:48 PM
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Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 32

Complete if Known	
Application Number	16/586,528
Filing Date	09-27-2019
First Named Inventor	KOPELMAN; Avi
Art Unit	2128
Examiner Name	MAPAR, BIJAN
Attorney Docket Number	22773-822.303

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.	Document Number / Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	001	US-RE35169	03-05-1996	LEMCHEN; Marc S. [Us] et al.	
	002	US-2467432	04-19-1949	KESLING; Harold D.	
	003	US-3407500	10-29-1968	KESLING; Peter C.	
	004	US-3600808	08-24-1971	REEVE; James Jackson. et al.	
	005	US-3660900	05-09-1972	ANDREWS; Lawrence F. et al.	
	006	US-3683502	08-15-1972	WALLSHEIN; Melvin. et al.	
	007	US-3738005	06-12-1973	COHEN; M. et al.	
	008	US-3860803	01-14-1975	LEVINE; Richard Carl.	
	009	US-3916526	11-04-1975	SCHUDY; Fred Frank.	
	010	US-3922786	12-02-1975	LAVIN; Joseph L.	
	011	US-3950851	04-20-1976	BERGERSEN; Earl O.	
	012	US-3983628	10-05-1976	ACEVEDO; Raul.	
	013	US-4014096	03-29-1977	DELLINGER; Eugene L.	
	014	US-4195046	03-25-1980	KESLING; Peter C. [Us] et al.	
	015	US-4253828	03-03-1981	COLES; Donna C. et al.	
	016	US-4324546	04-13-1982	HEITLINGER; Paul. et al.	
	017	US-4324547	04-13-1982	ARCAN; Mircea. et al.	
	018	US-4348178	09-07-1982	KURZ; Craven H.	
	019	US-4478580	10-23-1984	BARRUT; Luc P. [Fr] et al.	
	020	US-4500294	02-19-1985	LEWIS; William D. [Us] et al.	

Examiner Signature	/BIJAN MAPAR/	Date Considered	03/29/2020

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 2 of 32

Complete if Known	
Application Number	16/586,528
Filing Date	09-27-2019
First Named Inventor	KOPELMAN; Avi
Art Unit	2128
Examiner Name	MAPAR, BIJAN
Attorney Docket Number	22773-822.303

U. S. PATENT DOCUMENTS

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	021	US-4504225	03-12-1985	YOSHII; Osamu.	
	022	US-4505673	03-19-1985	YOSHII; Osamu [Jp] et al.	
	023	US-4526540	07-02-1985	DELLINGER; Eugene L. [Us] et al.	
	024	US-4575330	03-11-1986	HULL; Charles W. [Us] et al.	
	025	US-4575805	03-11-1986	MOERMANN; Werner H. [Ch] et al.	
	026	US-4591341	05-27-1986	ANDREWS; Lawrence F. [Us] et al.	
	027	US-4609349	09-02-1986	CAIN; Steve B. [Us] et al.	
	028	US-4611288	09-09-1986	DURET; Francois [Fr] et al.	
	029	US-4656860	04-14-1987	ORTHUBER; Wolfgang [De] et al.	
	030	US-4663720	05-05-1987	DURET; Francois [Fr] et al.	
	031	US-4664626	05-12-1987	KESLING; Peter C. [Us] et al.	
	032	US-4676747	06-30-1987	KESLING; Christopher K. [Us] et al.	
	033	US-4742464	05-03-1988	DURET; Francois. et al.	
	034	US-4755139	07-05-1988	ABBATTE; Gerard P. [Us] et al.	
	035	US-4763791	08-16-1988	HALVERSON; George E. [Us] et al.	
	036	US-4793803	12-27-1988	MARTZ; Martin G. [Us] et al.	
	037	US-4798534	01-17-1989	BREADS; Peter R. [Us] et al.	
	038	US-4836778	06-06-1989	BAUMRIND; Sheldon [Us] et al.	

Examiner Signature	/BIJAN MAPAR/	Date Considered	03/29/2020

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 3 of 32

Complete if Known	
Application Number	16/586,528
Filing Date	09-27-2019
First Named Inventor	KOPELMAN; Avi
Art Unit	2128
Examiner Name	MAPAR, BIJAN
Attorney Docket Number	22773-822.303

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	039	US-4837732	06-06-1989	BRANDESTINI; Marco [Ch] et al.	
	040	US-4850864	07-25-1989	DIAMOND; Michael K. [Us] et al.	
	041	US-4850865	07-25-1989	NAPOLITANO; John R. [Us] et al.	
	042	US-4856991	08-15-1989	BREADS; Peter R. [Us] et al.	
	043	US-4877398	10-31-1989	KESLING; Peter C. [Us] et al.	
	044	US-4880380	11-14-1989	MARTZ; Martin G. [Us] et al.	
	045	US-4889238	12-26-1989	BATCHELOR; Jay A. [Us] et al.	
	046	US-4890608	01-02-1990	STEER; Peter L. [Gb] et al.	
	047	US-4935635	06-19-1990	O'HARRA; Dale G. [Us] et al.	
	048	US-4936862	06-26-1990	WALKER; Peter S. [Gb] et al.	
	049	US-4937928	07-03-1990	VAN; Der Zel Joseph M. [Nl] et al.	
	050	US-4941826	07-17-1990	LORAN; William [Us] et al.	
	051	US-4964770	10-23-1990	STEINBICHLER; Hans [De] et al.	
	052	US-4975052	12-04-1990	SPENCER; William [Us] et al.	
	053	US-4983334	01-08-1991	ADELL; Loren S. [Us] et al.	
	054	US-5011405	04-30-1991	LEMCHEN; Marc S.	
	055	US-5017133	05-21-1991	MIURA; Fujio [Jp] et al.	

Examiner Signature	/BIJAN MAPAR/	Date Considered	03/29/2020

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Sheet 4 of 32

Complete if Known	
Application Number	16/586,528
Filing Date	09-27-2019
First Named Inventor	KOPELMAN; Avi
Art Unit	2128
Examiner Name	MAPAR, BIJAN
Attorney Docket Number	22773-822.303

U. S. PATENT DOCUMENTS

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	056	US-5027281	06-25-1991	REKOW; Elizabeth D. [Us] et al.	
	057	US-5035613	07-30-1991	BREADS; Peter R. [Us] et al.	
	058	US-5055039	10-08-1991	ABBATTE; Gerard P. [Us] et al.	
	059	US-5059118	10-22-1991	BREADS; Peter R. [Us] et al.	
	060	US-5100316	03-31-1992	WILDMAN; Alexander J. [Us] et al.	
	061	US-5121333	06-09-1992	RILEY; Donald R. [Us] et al.	
	062	US-5125832	06-30-1992	KESLING; Peter C.	
	063	US-5128870	07-07-1992	ERDMAN; Arthur G. [Us] et al.	
	064	US-5130064	07-14-1992	SMALLEY; Dennis R. [Us] et al.	
	065	US-5131843	07-21-1992	HILGERS; James J. [Us] et al.	
	066	US-5131844	07-21-1992	MARINACCIO; Paul J. [Us] et al.	
	067	US-5139419	08-18-1992	ANDREIKO; Craig A. [Us] et al.	
	068	US-5145364	09-08-1992	MARTZ; Martin G. [Us] et al.	
	069	US-5176517	01-05-1993	TRUAX; Lloyd H. [Us] et al.	
	070	US-5184306	02-02-1993	ERDMAN; Arthur G. et al.	
	071	US-5186623	02-16-1993	BREADS; Peter R. [Us] et al.	
	072	US-5257203	10-26-1993	RILEY; Donald R. et al.	

Examiner Signature	/BIJAN MAPAR/	Date Considered	03/29/2020

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Sheet 5 of 32

Complete if Known	
Application Number	16/586,528
Filing Date	09-27-2019
First Named Inventor	KOPELMAN; Avi
Art Unit	2128
Examiner Name	MAPAR, BIJAN
Attorney Docket Number	22773-822.303

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	073	US-5273429	12-28-1993	REKOW; Dianne [Us] et al.	
	074	US-5278756	01-11-1994	LEMCHEN; Marc S. [Us] et al.	
	075	US-5328362	07-12-1994	WATSON; Sherman L. et al.	
	076	US-5338198	08-16-1994	WU; Chuang-Jy [Ca] et al.	
	077	US-5340309	08-23-1994	ROBERTSON; James G. [Us] et al.	
	078	US-5342202	08-30-1994	DESHAYES; Marie-Josephe [Fr] et al.	
	079	US-5368478	11-29-1994	ANDREIKO; Craig A. [Us] et al.	
	080	US-5382164	01-17-1995	STERN; Sylvan S. [Us] et al.	
	081	US-5395238	03-07-1995	ANDREIKO; Craig A. [Us] et al.	
	082	US-5431562	07-11-1995	ANDREIKO; Craig A. [Us] et al.	
	083	US-5440326	08-08-1995	QUINN; Thomas J. [Us] et al.	
	084	US-5440496	08-08-1995	ANDERSSON; Matts [Se] et al.	
	085	US-5447432	09-05-1995	ANDREIKO; Craig A. [Us] et al.	
	086	US-5452219	09-19-1995	DEHOFF; Barry D. [Us] et al.	
	087	US-5454717	10-03-1995	ANDREIKO; Craig A. [Us] et al.	
	088	US-5456600	10-10-1995	ANDREIKO; Craig A. [Us] et al.	

Examiner Signature	/BIJAN MAPAR/	Date Considered	03/29/2020

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Art Unit	2128
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	089	US-5474448	12-12-1995	ANDREIKO; Craig A. [Us] et al.	
	090	US-5518397	05-21-1996	ANDREIKO; Craig A. et al.	
	091	US-5528735	06-18-1996	STRASNICK; Steven L. [Us] et al.	
	092	US-5533895	07-09-1996	ANDREIKO; Craig A. [Us] et al.	
	093	US-5542842	08-06-1996	ANDREIKO; Craig A. [Us] et al.	
	094	US-5549476	08-27-1996	STERN; Sylvan S. [Us] et al.	
	095	US-5562448	10-08-1996	MUSHABAC; David R.	
	096	US-5587912	12-24-1996	ANDERSSON; Matts [Se] et al.	
	097	US-5605459	02-25-1997	KURODA; Takayuki [Jp] et al.	
	098	US-5607305	03-04-1997	ANDERSSON; Matts [Se] et al.	
	099	US-5614075	03-25-1997	ANDRE Sr.; Larry E. [Us] et al.	
	100	US-5621648	04-15-1997	CRUMP; Craig D. [Us] et al.	
	101	US-5645420	07-08-1997	BERGERSEN; Earl O. [Us] et al.	
	102	US-5645421	07-08-1997	SLOOTSKY; Gary Lee [Us] et al.	
	103	US-5655653	08-12-1997	CHESTER; Bruce E. [Us] et al.	
	104	US-5683243	11-04-1997	ANDREIKO; Craig A. [Us] et al.	

Examiner Signature	/BIJAN MAPAR/	Date Considered	03/29/2020

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Sheet 7 of 32

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Filing Date	09-27-2019
First Named Inventor	KOPELMAN; Avi
Art Unit	2128
Examiner Name	MAPAR, BIJAN
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	105	US-5692894	12-02-1997	SCHWARTZ; Dann A. [Us] et al.	
	106	US-5725376	03-10-1998	POIRIER; Michel [Ca] et al.	
	107	US-5725378	03-10-1998	WANG; Hong-Chi [Tw] et al.	
	108	US-5733126	03-31-1998	ANDERSSON; Matts. et al.	
	109	US-5740267	04-14-1998	ECHERER; Scott J. [Us] et al.	
	110	US-5742700	04-21-1998	YOON; Douglas C. [Us] et al.	
	111	US-5799100	08-25-1998	CLARKE; Laurence P. [Us] et al.	
	112	US-5800174	09-01-1998	ANDERSSON; Matts [Se] et al.	
	113	US-5823778	10-20-1998	SCHMITT; Stephen M. [Us] et al.	
	114	US-5848115	12-08-1998	LITTLE; Francis H. [Us] et al.	
	115	US-5857853	01-12-1999	VAN; Nifterick Willem Frederick [Nl] et al.	
	116	US-5866058	02-02-1999	BATCHELDER; John Samuel [Us] et al.	
	117	US-5879158	03-09-1999	DOYLE; Walter A. [Us] et al.	
	118	US-5880961	03-09-1999	CRUMP; Craig D. [Us] et al.	
	119	US-5880962	03-09-1999	ANDERSSON; Matts [Se] et al.	
	120	US-5934288	08-10-1999	AVILA; Ricardo Scott [Us] et al.	
	121	US-5957686	09-28-1999	ANTHONY; Wayne L. [Us] et al.	

Examiner Signature	/BIJAN MAPAR/	Date Considered	03/29/2020

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 8 of 32

Complete if Known	
Application Number	16/586,528
Filing Date	09-27-2019
First Named Inventor	KOPELMAN; Avi
Art Unit	2128
Examiner Name	MAPAR, BIJAN
Attorney Docket Number	22773-822.303

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.	Document Number / Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	122	US-5964587	10-12-1999	SATO; Mikio [Jp] et al.	
	123	US-5971754	10-26-1999	SONDHI; Anoop. et al.	
	124	US-5975893	11-02-1999	CHISHTI; Muhammad. et al.	
	125	US-6015289	01-18-2000	ANDREIKO; Craig A. et al.	
	126	US-6044309	03-28-2000	HONDA; Kenichi [Jp] et al.	
	127	US-6049743	04-11-2000	BABA; Masami [Jp] et al.	
	128	US-6062861	05-16-2000	ANDERSSON; Matts.	
	129	US-6068482	05-30-2000	SNOW; Michael Desmond [Au] et al.	
	130	US-6099314	08-08-2000	KOPELMAN; Avi [Il] et al.	
	131	US-6123544	09-26-2000	CLEARY; James D.	
	132	US-6152731	11-28-2000	JORDAN; Russell A. [Us] et al.	
	133	US-6183248	02-06-2001	CHISHTI; Muhammad. et al.	
	134	US-6190165	02-20-2001	ANDREIKO; Craig A. [Us] et al.	
	135	US-6217325	04-17-2001	CHISHTI; Muhammad. et al.	
	136	US-6217334	04-17-2001	HULTGREN; Bruce Willard [Us] et al.	
	137	US-6227850	05-08-2001	CHISHTI; Muhammad Ziaullah Khan [Us] et al.	
	138	US-6244861	06-12-2001	ANDREIKO; Craig A. et al.	
	139	US-6309215	10-30-2001	PHAN; Loc X. et al.	
	140	US-6315553	11-13-2001	SACHDEVA; Rohit [Us] et al.	

Examiner Signature	/BIJAN MAPAR/	Date Considered	03/29/2020

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 9 of 32

Complete if Known	
Application Number	16/586,528
Filing Date	09-27-2019
First Named Inventor	KOPELMAN; Avi
Art Unit	2128
Examiner Name	MAPAR, BIJAN
Attorney Docket Number	22773-822.303

U. S. PATENT DOCUMENTS

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	141	US-6322359	11-27-2001	JORDAN; Russell A. et al.	
	142	US-6334853	01-01-2002	KOPELMAN; Avi. et al.	
	143	US-6350120	02-26-2002	SACHDEVA; Rohit [Us] et al.	
	144	US-6382975	05-07-2002	POIRIER; Michel [Ca] et al.	
	145	US-6398548	06-04-2002	MUHAMMAD; Chishti. et al.	
	146	US-6402707	06-11-2002	ERNST; Maurice M. [Il] et al.	
	147	US-6482298	11-19-2002	BHATNAGAR; Parijat [Us] et al.	
	148	US-6524101	02-25-2003	PHAN; Loc X. [Us] et al.	
	149	US-6554611	04-29-2003	SHISHTI; Muhammad. et al.	
	150	US-6572372	06-03-2003	PHAN; Loc X. [Us] et al.	
	151	US-6629840	10-07-2003	CHISHTI; Muhammad. et al.	
	152	US-6705863	03-16-2004	PHAN; Loc X. [Us] et al.	
	153	US-6722880	04-20-2004	CHISHTI; Muhammad. et al.	
	154	US-6739869	05-25-2004	TAUB; Eldad. et al.	
	155	US-7029275	04-18-2006	RUBBERT; Ruedger. et al.	
	156	US-7347686	03-25-2008	MARSHALL; Michael Craig [Us] et al.	
	157	US-7476100	01-13-2009	KUO; Eric E. [Us] et al.	
	158	US-7536234	05-19-2009	KOPELMAN; Avi. et al.	
	159	US-7555403	06-30-2009	KOPELMAN; Avi. et al.	
	160	US-9299192	03-29-2016	KOPELMAN; Avi.	

Examiner Signature	/BIJAN MAPAR/	Date Considered	03/29/2020

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Sheet 10 of 32

Complete if Known	
Application Number	16/586,528
Filing Date	09-27-2019
First Named Inventor	KOPELMAN; Avi
Art Unit	2128
Examiner Name	MAPAR, BIJAN
Attorney Docket Number	22773-822.303

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Examiner Initials*	Cite No.	Document Number / Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	161	US-20020006217	01-17-2002	RUBBERT; Rudger. et al.	
	162	US-20020006597	01-17-2002	ANDREIKO; Craig A. et al.	
	163	US-20030009252	01-09-2003	PAVLOVSKAIA; Elena [Us] et al.	
	164	US-20030139834	07-24-2003	NIKOLSKIY; Sergey [Ru] et al.	
	165	US-20030215764	11-20-2003	KOPELMAN; Avi. et al.	
	166	US-20030224311	12-04-2003	CRONAUER; Edward A. [Us] et al.	
	167	US-20030232302	12-18-2003	BABAYOFF; Noam [Il] et al.	
	168	US-20040128010	07-01-2004	PAVLOVSKAIA; Elena. et al.	
	169	US-20040155975	08-12-2004	HART; Douglas P. et al.	
	170	US-20050055118	03-10-2005	NIKOLSKIY; Sergey. et al.	
	171	US-20050283065	12-22-2005	BABAYOFF; Noam.	
	172	US-20070015111	01-18-2007	KOPELMAN; Avi. et al.	
	173	US-20070172112	07-26-2007	PALEY; Eric B. et al.	
	174	US-20070236494	10-11-2007	KRIVESHKO; Ilya A.	
	175	US-20080206705	08-28-2008	KAZA; Srinivas [Us] et al.	
	176	US-20090316966	12-24-2009	MARSHALL; Michael Craig. et al.	
	177	US-20100114351	05-06-2010	KOPELMAN; Avi. et al.	
	178	US-20130110469	05-02-2013	KOPELMAN; Avi [Us] et al.	

Examiner Signature	/BIJAN MAPAR/	Date Considered	03/29/2020

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Sheet 11 of 32

Complete if Known	
Application Number	16/586,528
Filing Date	09-27-2019
First Named Inventor	KOPELMAN; Avi
Art Unit	2128
Examiner Name	MAPAR, BIJAN
Attorney Docket Number	22773-822.303

FOREIGN PATENT DOCUMENTS

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	001	AU-3031677-A	05-10-1979	SUYEHIRO H .		☐
	002	AU-517102-B2	07-09-1981	HITO SUYEHIRO.		☐
	003	AU-5598894-A	06-08-1994	ORMCO CORP.		☐
	004	CA-1121955-A	04-20-1982	SUYEHIRO HITO.		☐
	005	DE-2749802-A1	05-11-1978	SUYEHIRO HITO.	Abstract:	☒
	006	DE-69327661-T2	07-20-2000	ORMCO CORP [US]	Abstract:	☒
	007	EP-0091876-A1	10-19-1983	DURET FRANCOIS [FR], et al.	Abstract:	☒
	008	EP-0299490-A2	01-18-1989	STEINBICHLER HANS [DE]	Abstract:	☒
	009	EP-0376873-A2	07-04-1990	SHAFIR AARON [IL], et al.		☐
	010	EP-0490848-A2	06-17-1992	NOBELPHARMA AB [SE]		☐

Examiner Signature	/BIJAN MAPAR/	Date Considered	03/29/2020

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Sheet 12 of 32

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Application Number	16/586,528
Filing Date	09-27-2019
First Named Inventor	KOPELMAN; Avi
Art Unit	2128
Examiner Name	MAPAR, BIJAN
Attorney Docket Number	22773-822.303

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	011	EP-0541500-A1	05-12-1993	NOBELPHARMA AB [SE]		☐
	012	EP-0667753-B1	01-19-2000	ORMCO CORP [US]		☐
	013	EP-0731673-B1	05-30-2001	NOBEL BIOCARE AB [SE]		☐
	014	EP-0774933-B1	12-06-2000	SANDVIK AB [SE], et al.		☐
	015	EP-1901235-A1	03-19-2008	HONDA RES INST EUROPE GMBH [DE]		☐
	016	ES-463897-A1	01-01-1980	HITO SUYEHIRO D [US]	Abstract:	☒
	017	FR-2369828-A1	06-02-1978	SUYEHIRO HITO [US]	Abstract:	☒
	018	FR-2652256-A1	03-29-1991	JOURDA GERARD., et al.	Abstract:	☒
	019	GB-1550777-A	08-22-1979	SUYEHIRO H.		☐
	020	JP-08508174	09-03-1996	ANDREIKO et al.		☐

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Sheet 13 of 32

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Application Number	16/586,528
Filing Date	09-27-2019
First Named Inventor	KOPELMAN; Avi
Art Unit	2128
Examiner Name	MAPAR, BIJAN
Attorney Docket Number	22773-822.303

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	021	JP-H0428359-A	01-30-1992	MITSUBISHI PETROCHEMICAL CO.	Abstract:	☒
	022	JP-H08508174-A	09-03-1996	ORMCO CORP.	Abstract:	☒
	023	JP-S5358191-A	05-25-1978	YOSHII OSAMU., et al.	Abstract:	☒
	024	WO-0008415-A1	02-17-2000	CADENT LTD [IL], et al.		☐
	025	WO-03094102-A1	11-13-2003	ORAMETRIX INC [US]		☐
	026	WO-2004087000-A1	10-14-2004	CADENT LTD [IL], et al.		☐
	027	WO-2009146164-A1	12-03-2009	BIOMET 3I LLC [US], et al.		☐
	028	WO-2010001401-A1	01-07-2010	CADENT LTD [IL], et al.		☐
	029	WO-2012011101-A2	01-26-2012	CADENT LTD [IL], et al.		☐
	030	WO-9008512-A1	08-09-1990	DOLPHIN IMAGING SYSTEMS INC [US]		☐

Examiner Signature	/BIJAN MAPAR/	Date Considered	03/29/2020

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 14 of 32

Complete if Known	
Application Number	16/586,528
Filing Date	09-27-2019
First Named Inventor	KOPELMAN; Avi
Art Unit	2128
Examiner Name	MAPAR, BIJAN
Attorney Docket Number	22773-822.303

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]
	031	WO-9104713-A1	04-18-1991	JOURDA GERARD [FR], et al.	Abstract:	☒
	032	WO-9410935-A1	05-26-1994	ORMCO CORP [US]		☐
	033	WO-9832394-A1	07-30-1998	HULTGREN BRUCE WILLARD [US]		☐
	034	WO-9844865-A1	10-15-1998	NOBEL BIOCARE AB [SE], et al.		☐
	035	WO-9858596-A1	12-30-1998	ALIGN TECHNOLOGY INC [US], et al.		☐

NON-PATENT LITERATURE DOCUMENTS

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	001	AADR. AMERICAN ASSOCIATION FOR DENTAL RESEARCH, Summary of Activities, March 20-23,1980, Los Angeles, CA, p. 195.	☐
	002	ALCANIZ, et al., "An Advanced System for the Simulation and Planning of Orthodontic Treatments," Karl Heinz Hohne and Ron Kikinis (eds.), Visualization in Biomedical Computing, 4th Intl. Conf., VBC '96, Hamburg, Germany, September 22-25, 1996, Springer-Verlag, pp. 511-520.	☐

Examiner Signature	/BIJAN MAPAR/	Date Considered	03/29/2020

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	003	ALEXANDER et al., "The DigiGraph Work Station Part 2 Clinical Management," JCO, pp. 402-407 (July 1990).	☐
	004	ALTSCHULER, "3D Mapping of Maxillo-Facial Prosthesis," AADR Abstract #607, 2 pages total, (1980).	☐
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	012	BAUMRIND et al., "A Stereophotogrammetric System for the Detection of Prosthesis Loosening in Total Hip Arthroplasty," NATO Symposium on Applications of Human Biostereometrics," July 9-13, 1978, SPIE, Vol. 166, pp. 112-123.	☐
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	019	BIGGERSTAFF et al., "Computerized Analysis of Occlusion in the Postcanine Dentition," Am. J. Orthod., 61(3): 245-254 (March 1972).	☐
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 21 of 32

Complete if Known	
Application Number	16/586,528
Filing Date	09-27-2019
First Named Inventor	KOPELMAN; Avi
Art Unit	2128
Examiner Name	MAPAR, BIJAN
Attorney Docket Number	22773-822.303

NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
	056	English translation of Japanese Laid-Open Publication No. 63-11148 to inventor T. Ozukuri (Laid-Open on January 18, 1998) pp. 1-7.	☐
	057	FELTON et al., "A Computerized Analysis of the Shape and Stability of Mandibular Arch Form," Am. J. Orthod. Dentofacial Orthop., 92(6):478-483 (December 1987).	☐
	058	FRIEDE et al., "Accuracy of Cephalometric Prediction in Orthognathic Surgery," Abstract of Papers, J. Dent. Res., 70:754-760 (1987).	☐
	059	FUTTERLING et al., "Automated Finite Element Modeling of a Human Mandible with Dental Implants," JS WSCG '98 - Conference Program, retrieved from the Internet: < http://wscg.zcu.cz/wscg98/papers98/Strasser 98.pdf, 8 pages.	☐
	060	GAO et al., "3-D element Generation for Multi-Connected Complex Dental and Mandibular Structure," Proc. Intl Workshop on Medical Imaging and Augmented Reality, pp. 267-271 (June 12, 2001).	☐
	061	GIM-ALLDENT Deutschland, "Das DUX System: Die Technik," 2 pages total (2002).	☐
	062	GOTTLEIB et al., "JCO Interviews Dr. James A. McNamura, Jr., on the Frankel Appliance: Part 2: Clinical 1-1 Management, "J. Clin. Orthod., 16(6):390-407 (June 1982).	☐
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	064	GUESS et al., "Computer Treatment Estimates In Orthodontics and Orthognathic Surgery," JCO, pp. 262- 28 (April 1989).	☐

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	065	HEAVEN et al., "Computer-Based Image Analysis of Artificial Root Surface Caries," Abstracts of Papers," J. Dent. Res., 70:528 (April 17-21, 1991).	☐
	066	HIGHBEAM RESEARCH, "Simulating Stress Put on Jaw," Tooling & Production [online], November 1996, n pp. 1-2, retrieved from the Internet on 11/05/2004, URL http://static.highbeam.com/t/toolingampproduction/november011996/simulatingstressputonfa... > .	☐
	067	HIKAGE, "Integrated Orthodontic Management System for Virtual Three-Dimensional Computer Graphic Simulation and Optical Video Image Database for Diagnosis and Treatment Planning", Journal of Japan KA Orthodontic Society, February 1987, English translation, pp. 1-38, Japanese version, 46(2), pp. 248-269 (60 pages total).	☒
	068	HOFFMANN, et al., "Role of Cephalometry for Planning of Jaw Orthopedics and Jaw Surgery Procedures," (Article Summary in English, article in German), Informationen, pp. 375-396 (March 1991).	☒
	069	HOJJATIE et al., "Three-Dimensional Finite Element Analysis of Glass-Ceramic Dental Crowns," J. Biomech., 23(11):1157-1166 (1990).	☐
	070	HUCKINS, "CAD-CAM Generated Mandibular Model Prototype from MRI Data," AAOMS, p. 96 (1999).	☐
	071	Important Tip About Wearing the Red White & Blue Active Clear Retainer System. Allesee Orthodontic Appliances-Pro Lab. 1 page (1998).	☐
	072	Institution Decision, 3SHAPE A/S v. ALIGN TECHNOLOGY, INC., IPR2019-00134, Paper No. 8, (P.T.A.B. July 22, 2019).	☐

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Art Unit	2128
Examiner Name	MAPAR, BIJAN
Attorney Docket Number	22773-822.303

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	073	International Search Report and Written Opinion dated 04/11/2014 for PCT/IL2011/000574. 10 pages.	☐
	074	JCO Interviews, "Craig Andreiko , DDS, MS on the Elan and Orthos Systems," JCO, pp. 459-468 (Aug. 1994).	☐
	075	JCO Interviews, "Dr. Homer W. Phillips on Computers in Orthodontic Practice, Part 2," JCO. 1997; 1983:819-831.	☐
	076	JERROLD, "The Problem, Electronic Data Transmission and the Law," AJO-DO, pp. 478-479 (Apr. 1988).	☐
	077	JONES et al., "An Assessment of the Fit of a Parabolic Curve to Pre- and Post-Treatment Dental Arches," Br. J. Orthod., 16:85-93 (1989).	☐
	078	JP FABER et al., "Computerized Interactive Orthodontic Treatment Planning," Am. J. Orthod., 73(1):36-46 (January 1978).	☐
	079	KAMADA et.al., Case Reports On Tooth Positioners Using LTV Vinyl Silicone Rubber, J. Nihon University School of Dentistry (1984) 26(1): 11 -29.	☐
	080	KAMADA et.al., Construction of Tooth Positioners with LTV Vinyl Silicone Rubber and Some Case KJ Reports, J. Nihon University School of Dentistry (1982) 24(1):1-27.	☐
	081	KANAZAWA et al., "Three-Dimensional Measurements of the Occlusal Surfaces of Upper Molars in a Dutch Population," J. Dent Res., 63(11):1298-1301 (November 1984).	☐

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	082	KESLING, Coordinating the Predetermined Pattern and Tooth Positioner with Conventional Treatment, KN Am. J. Orthod. Oral Surg. (1946) 32:285-293.	☐
	083	KESLING et al., The Philosophy of the Tooth Positioning Appliance, American Journal of Orthodontics and Oral surgery. 1945; 31:297-304.	☐
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	086	KUNII et al., "Articulation Simulation for an Intelligent Dental Care System," Displays 15:181-188 (1994).	☐
	087	KURODA et al., Three-Dimensional Dental Cast Analyzing System Using Laser Scanning, Am. J. Orthod. Dentofac. Orthop. (1996) 110:365-369.	☐
	088	LAURENDEAU, et al., "A Computer-Vision Technique for the Acquisition and Processing of 3-D Profiles of 7 KR Dental Imprints: An Application in Orthodontics," IEEE Transactions on Medical Imaging, 10(3):453-461 (September 1991.	☐
	089	LEINFELDER, et al., "A New Method for Generating Ceramic Restorations: a CAD-CAM System," J. Am. 1-1 Dent. Assoc., 118(6):703-707 (June 1989).	☐
	090	MANETTI, et al., "Computer-Aided Cefalometry and New Mechanics in Orthodontics," (Article Summary in English, article in German), Fortschr Kieferorthop. 44, 370-376 (Nr. 5), 1983.	☐

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	091	MCCANN, "Inside the ADA," J. Amer. Dent. Assoc., 118:286-294 (March 1989).	☐
	092	MCNAMARA et al., "Invisible Retainers," J. Clin. Orthod., pp. 570-578 (August 1985).	☐
	093	MCNAMARA et al., Orthodontic and Orthopedic Treatment in the Mixed Dentition, Needham Press, pp. 347-353 (January 1993).	☐
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	095	MOLES, "Correcting Mild Malalignments - As Easy As One, Two, Three," AOA/Pro Corner, Vol. 11, No. 1, 2 pages (2002).	☐
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	100	PAUL et al., "Digital Documentation of Individual Human Jaw and Tooth Forms for Applications in Orthodontics, Oral Surgery and Forensic Medicine" Proc. of the 24th Annual Conf. of the IEEE Industrial Electronics Society (IECON '98), Sept. 4, 1998, pp. 2415-2418.	☐
	101	PINKHAM, "Foolish Concept Propels Technology," Dentist, 3 pages total, January/February 1989.	☐
	102	PINKHAM, "Inventor's CAD/CAM May Transform Dentistry," Dentist, 3 pages total, September 1990.	☐
	103	PONITZ, "Invisible Retainers," Am. J. Orthod., 59(3):266-272 (March 1971).	☐
	104	PROCERA RESEARCH PROJECTS, "PROCERA Research Projects 1993 — Abstract Collection," pp. 3- 7; 28 (1993).	☐
	105	PROFFIT et al., Contemporary Orthodontics, (Second Ed.), Chapter 15, Mosby Inc., pp 470-533 (October 1993.	☐
	106	RAINTREE ESSIX & ARS MATERIALS, INC., Raintree Essix, Technical Magazine Table of contents and Essix Appliances, < http:// www.essix.com/magazine/defaulthtml > Aug. 13, 1997.	☐
	107	REDMOND et al., "Clinical Implications of Digital Orthodontics," Am. J. Orthod. Dentofacial Orthop., 117(2):240-242 (2000).	☐

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	108	REKOW, "A Review of the Developments in Dental CAD/CAM Systems," (contains references to Japanese efforts and content of the papers of particular interest to the clinician are indicated with a one line summary of their content in the bibliography), Curr. Opin. Dent., 2:25-33 (June 1992).	☐
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	110	REKOW, "Computer-Aided Design and Manufacturing in Dentistry: A Review of the State of the Art," J. Prosthet. Dent., 58(4):512-516 (October 1987).	☐
	111	REKOW, "Dental CAD-CAM Systems: What is the State of the Art?", J. Amer. Dent. Assoc., 122:43-48 1991.	☐
	112	REKOW et al., "CAD/CAM for Dental Restorations - Some of the Curious Challenges," IEEE Trans. Biomed. Eng., 38(4):314-318 (April 1991).	☐
	113	REKOW et al., "Comparison of Three Data Acquisition Techniques for 3-D Tooth Surface Mapping," Annual International Conference of the IEEE Engineering in Medicine and Biology Society, 13(1):344-345 1991.	☐
	114	REKOW, "Feasibility of an Automated System for Production of Dental Restorations, Ph.D. Thesis," Univ. of Minnesota, 244 pages total, November 1988.	☐
	115	RICHMOND et al., "The Development of a 3D Cast Analysis System," Br. J. Orthod., 13(1):53-54 (January 1986).	☐

Examiner Signature	/BIJAN MAPAR/	Date Considered	03/29/2020

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 28 of 32

Complete if Known	
Application Number	16/586,528
Filing Date	09-27-2019
First Named Inventor	KOPELMAN; Avi
Art Unit	2128
Examiner Name	MAPAR, BIJAN
Attorney Docket Number	22773-822.303

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	116	RICHMOND et al., "The Development of the PAR Index (Peer Assessment Rating): Reliability and Validity," Eur. J. Orthod., 14:125-139 (1992).	☐
	117	RICHMOND, "Recording The Dental Cast In Three Dimensions," Am. J. Orthod. Dentofacial Orthop., 92(3):199-206 (September 1987).	☐
	118	RUDGE, "Dental Arch Analysis: Arch Form, A Review of the Literature," Eur. J. Orthod., 3(4):279-284 1981.	☐
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	125	SIRONA DENTAL SYSTEMS GmbH, CEREC 3D, Manuel utiiisateur, Version 2.0X (in French), 2003,114 pages total.	☐
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	127	STURMAN, "Interactive Keyframe Animation of 3-D Articulated Models," Proceedings Graphics Interface '84, May-June 1984, pp. 35-40.	☐
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	134	U.S. Department of Commerce, National Technical Information Service, "Automated Crown Replication Using Solid Photography SM," Solid Photography Inc., Melville NY, October 1977, 20 pages total.	☐
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	143	WARUNEK et.al., Clinical Use of Silicone Elastomer Applicances, JCO (1989) XXIII(10):694-700.	☐
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	150	YAMAMOTO et al., "Optical Measurement of Dental Cast Profile and Application to Analysis of Three-Dimensional Tooth Movement in Orthodontics," Front. Med. Biol. Eng., 1(2):119-130 (1988).	☐

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Bibliographic Data

Application No: 16/586,528

Foreign Priority claimed: ○ Yes ◉ No

35 USC 119 (a-d) conditions met: ☐ Yes ☑ No ☐ Met After Allowance

Verified and Acknowledged: /BIJAN MAPAR/ Examiner's Signature | Initials

Title: METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
09/27/2019	703	2128	22773-822.303
RULE			

APPLICANTS

Align Technology, Inc., San Jose, CA,

INVENTORS

Avi Kopelman Palo Alto, CA, UNITED STATES

CONTINUING DATA

This application is a CON of 15050673 02/23/2016

15050673 is a CON of 13574723 01/04/2013 PAT 9299192

13574723 is a 371 of PCT/IL11/00574 07/19/2011

PCT/IL11/00574 has PRO of 61365556 07/19/2010

FOREIGN APPLICATIONS

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UNITED STATES

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650 Page Mill Road
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I hereby certify that this correspondence is being filed via EFS-Web with the United States Patent and Trademark Office on April 21, 2020

WILSON SONSINI GOODRICH & ROSATI

By: /Hillary Pratt/

Attorney Docket No.: 22773-822.303
Client Ref. No.: 7034.WO.US.C1.C2

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Confirmation No. 9600
Avi Kopelman	
Application No.: 16/586,528	Examiner: Bijan Mapar
Filed: September 27, 2019	Art Unit: 2128
For: METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS	AMENDMENT AFTER ALLOWANCE UNDER 37 C.F.R 1.312
Customer No. 107046	

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

Prior to issuance of the patent, Applicant respectfully requests entry of this amendment under 37 C.F.R. 1.312 for the above-captioned patent application.

Amendments to the Specification begin on page 2.

Amendments to the Claims are reflected in the listing of claims beginning on page 3.

Remarks begin on page 8.

Amendments to the Specification:

Please replace the Title as follows:

~~METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS~~

METHODS AND SYSTEMS FOR CREATING AND INTERACTING WITH THREE DIMENSIONAL VIRTUAL MODELS

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

1. (Currently Amended) A system for scanning a patient's teeth for a dental procedure, the system comprising:

a hand-held intraoral scanner; and

a computer readable medium including instructions that when executed by a computer system, cause the computer system to:

receive first scan data of the patient's teeth from the hand-held intraoral scanner;

display, to a display, a model of the patient's teeth, wherein the model of the patient's teeth is based on the received first scan data of the patient's teeth;

receive user input defining a portion of the model to be removed;

remove, from the displayed model, a removed surface portion of the model to be removed according to the user input;

receive second scan data of the patient's teeth from the hand-held intraoral scanner, the second scan data including surface data of a physically changed portion of the patient's ~~intra-oral~~ intraoral cavity;

replace at least a portion of the removed surface portion of the model using the received second scan data of the patient's teeth including surface data of a physically changed portion of the patient's intraoral cavity; and

output, to the display, the model of the patient's teeth with the portion of the removed surface portion replaced using the received second scan data.

2. (Previously Presented) The system of claim 1, wherein the hand-held intraoral scanner comprises a probing member with a sensing face, an illumination unit, a light focusing optics defining one or more focal planes forward the sensing face, and a translation mechanism for displacing the one or more focal planes relative to the sensing face.

3. (Previously Presented) The system of claim 2, wherein the system further comprises the computer system and the display; wherein the system further comprises a mouse or

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wherein the display comprises a touch screen display; and wherein the user input defining portion of the model to be removed is received by the mouse or the touch screen display.

4. (Previously Presented) The system of claim 1, wherein the instructions to replace the at least the portion of the removed surface portion of the model using the received second scan data comprise instructions to register the received second scan data with the model.

5. (Original) The system of claim 4, wherein the received second scan data is registered with the model by aligning identifying data of the received second scan data with corresponding parts of the model.

6. (Previously Presented) The system of claim 5, wherein the instructions to replace the at least the portion of the removed surface portion of the model using the received second scan data comprise instructions to further stitch a portion of the received second scan data with the model.

7. (Previously Presented) The system of claim 6, wherein the instructions to replace the at least the portion of the removed surface portion of the model using the received second scan data comprise instructions to further discard a remainder of the received second scan data, the remainder including the identifying surface data, after stitching the portion of the received second scan data with the model.

8. (Currently Amended) The system of claim 1, wherein the computer readable medium further includes instructions that when executed by the computer system, ~~causes~~ cause the computer system to: mark, on the displayed model, the user input defined portion, after receiving the user input and before removing the removed surface portion of the model.

9. (Currently Amended) A method for scanning a patient's teeth for a dental procedure, the method comprising:

receiving first scan data of the patient's teeth from a hand-held intraoral scanner;

displaying, to a display, a model of the patient's teeth, wherein the model of the patient's teeth is based on the received first scan data of the patient's teeth;

receiving user input via the displayed model demarcating a portion of the model to be retained and a surface portion of the model to be replaced;

receiving second scan data of the patient's teeth from the hand-held intraoral scanner, the second scan data including surface data of a physically changed portion of the patient's ~~intra-oral~~ intraoral cavity;

replacing at least a portion of the surface portion of the model to be replaced according to the user input using at least a portion of the second scan data of the patient's teeth including the physically changed portion; and

outputting, to the display, the model of the patient's teeth with the at least the portion of the surface portion replaced using the second scan data.

10. (Original) The method of claim 9, further comprising marking an area on the displayed model associated with the received user input.

11. (Previously Presented) The method of claim 9, wherein replacing the at least the portion of the surface portion of the model to be replaced according to the user input using at least the portion of the second scan data comprises registering the second scan data with the model by aligning identifying data of the second scan data with corresponding parts of the model.

12. (Previously Presented) The method of claim 11, wherein replacing the at least the portion of the surface portion of the model to be replaced according to the user input using at least the portion of the second scan data further comprises stitching the at least the portion of the second scan data with the model.

13. (Previously Presented) The method of claim 12, wherein replacing the at least the portion of the surface portion of the model to be replaced according to the user input using the at least the portion of the second scan data further comprises discarding a remainder of the second scan data, including the identifying surface data, after stitching the at least the portion of the second scan data with the model.

14. (Previously Presented) The method of claim 9, wherein the model of the patient's teeth comprises a tooth preparation having a finish line, wherein a portion of the finish line

is obscured or distorted, and wherein the physical change results in the finish line not being obscured or distorted.

15. (Previously Presented) The method of claim 9, wherein the model of the patient's teeth comprises a tooth preparation that accurately represents a surface of a physical preparation of the patient, and wherein the method further comprises analyzing the tooth preparation of the model to determine whether the surface of the physical preparation is suitable for a dental prosthesis; and wherein the physical change is a physical modification of the surface of the physical preparation of the patient.

16. (Original) The method of claim 15, wherein the dental prosthesis comprises a dental crown and wherein the tooth preparation analysis comprises analysis of the model with respect to a virtual model of an opposing dentition of an opposite jaw to determine whether the tooth preparation would result in an inadequate structure for the dental crown.

17. (Previously Presented) A system for intraorally scanning a patient's teeth for a dental procedure, the system comprising:

a hand-held intraoral scanner; and

a computer readable medium including instructions that when executed by a computer system, cause the computer system to:

receive first scan data of the patient's teeth from the hand-held intraoral scanner;

display, to a display, a model of the patient's teeth, wherein the model of the patient's teeth is based on the received first scan data of the patient's teeth;

receive user input defining a portion of the model to be removed;

after receiving the user input, remove, from the displayed model, a removed surface portion of the model to be removed according to the user input;

after removing the portion of the model, receive second scan data of the patient's teeth from the hand-held intraoral scanner;

register the second scan data with the model by aligning identifying data of the second scan data with corresponding parts of the model;

replace at least a portion of the removed surface portion of the model using at least a portion of the received second scan data of the patient's teeth;

discarding a remainder of the second scan data, including the identifying data, after registering the second scan data with the model; and

output, to the display, the model of the patient's teeth with the portion of the removed surface portion replaced using the received scan data.

18. (Previously Presented) The system of claim 17, wherein the hand-held intraoral scanner comprises a probing member with a sensing face, an illumination unit, a light focusing optics defining one or more focal planes forward the sensing face, and a translation mechanism for displacing the one or more focal planes relative to the sensing face.

19. (Previously Presented) The system of claim 18, wherein the system further comprises the computer system and the display; wherein the system further comprises a mouse or wherein the display comprises a touch screen display; and wherein the user input defining portion of the model to be removed is received by the mouse or the touch screen display.

20. (Previously Presented) The system of claim 17, wherein the portion of the removed surface portion of the model is replaced using at least the portion of the received second scan data by registering the second scan data with the model.

REMARKS

In this Amendment, Applicant amends the Specification to update the title. Additionally, Applicant amends claims 1, 8, and 9 for consistency in claim terminology. No new matter has been added.

Further, the Commissioner is hereby authorized to charge any additional fees or credit any overpayment in connection with this paper to Deposit Account No. 23-2415.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 206-883-2500.

Respectfully submitted,

Dated: April 20, 2020

/Garrett Potter/

Garrett Potter
Registration No. 76,602

WILSON SONSINI GOODRICH & ROSATI
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Electronic Acknowledgement Receipt	
EFS ID:	39219670
Application Number:	16586528
International Application Number:	
Confirmation Number:	9600
Title of Invention:	METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS
First Named Inventor/Applicant Name:	Avi Kopelman
Customer Number:	107046
Filer:	Garrett T Potter/Hillary Pratt
Filer Authorized By:	Garrett T Potter
Attorney Docket Number:	22773-822.303
Receipt Date:	21-APR-2020
Filing Date:	27-SEP-2019
Time Stamp:	17:11:14
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	22773_822_303_MarkedupADS.pdf	794780 887dc5261ec29641e2fbe8fcc628283f7542c2d0	no	8
Warnings:					

Information:					
This is not an USPTO supplied ADS fillable form					
2	Request for Corrected Filing Receipt	22773_822_303_MarkedupFR.pdf	370299 419bc22782f3fc19e261be53edca78053cc8a32d	no	3
Warnings:					
Information:					
3	Request for Corrected Filing Receipt	22773_822_303_RequestforCorrectedFR.pdf	104775 c024c5cbadb0189e44df868e72c44a9a4eb819c8	no	2
Warnings:					
Information:					
4	Power of Attorney	22773_822_303_POA.pdf	560860 6b45d2e9775484d5d0907c00fb6f19708c624e57	no	2
Warnings:					
The page size in the PDF is too large. The pages should be 8.5 x 11 or A4. If this PDF is submitted, the pages will be resized upon entry into the Image File Wrapper and may affect subsequent processing					
Information:					
5	Assignee showing of ownership per 37 CFR 3.73	22773_822_303_StatementUnder373c.pdf	163505 9522bcb59206926478cf6163e1862b5e4440abe2	no	3
Warnings:					
Information:					
6		22773_822_303_312Amendment.pdf	128559 c77e0f0707f4627e6db69f9d103096926a080f91	yes	8

Multipart Description/PDF files in .zip description		
Document Description	**Start**	**End**
Amendment after Notice of Allowance (Rule 312)	1	1
Specification	2	2
Claims	3	7
Applicant Arguments/Remarks Made in an Amendment	8	8

Warnings:

Information:	
Total Files Size (in bytes):	2122778

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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	22773-822.303
	Application Number	16/586,528
Title of Invention	~~METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS~~ METHODS AND SYSTEMS FOR CREATING AND INTERACTING WITH THREE DIMENSIONAL VIRTUAL MODELS	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 — Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Avi		Kopelman	

Residence Information (Select One) ● US Residency Non US Residency Active US Military Service

City	Palo Alto	State/Province	CA	Country of Residence	US

Mailing Address of Inventor:

Address 1	776 Josina Avenue
Address 2	

City	Palo Alto	State/Province	CA
Postal Code	94306	Country	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	107046		
Email Address	patentdocket@wsgr.com	Add Email	Remove Email

Application Information: METHODS AND SYSTEMS FOR CREATING AND INTERACTING WITH THREE DIMENSIONAL VIRTUAL MODELS

Title of the Invention	~~METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS~~		
Attorney Docket Number	22773-822.303	Small Entity Status Claimed	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	8	Suggested Figure for Publication (if any)	

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	22773-822.303
	Application Number	16/586,528
Title of Invention	~~METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS~~ METHODS AND SYSTEMS FOR CREATING AND INTERACTING WITH THREE DIMENSIONAL VIRTUAL MODELS	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	● Customer Number	US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	107046		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
16/586,528	Continuation of	15050673	2016-02-23

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	22773-822.303
	Application Number	16/586,528

Title of Invention	~~METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS~~ METHODS AND SYSTEMS FOR CREATING AND INTERACTING WITH THREE DIMENSIONAL VIRTUAL MODELS

Prior Application Status	Patented			Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
15050673	Continuation of	13574723	2013-01-04	9299192	2016-03-29

Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
13574723	a 371 of international	PCT/IL11/00574	2011-07-19

Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
PCT/IL11/00574	Claims benefit of provisional	61365556	2010-07-19

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	22773-822.303
	Application Number	16/586,528
Title of Invention	~~METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS~~ METHODS AND SYSTEMS FOR CREATING AND INTERACTING WITH THREE DIMENSIONAL VIRTUAL MODELS	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	22773-822.303
	Application Number	16/586,528
Title of Invention	~~METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS~~ METHODS AND SYSTEMS FOR CREATING AND INTERACTING WITH THREE DIMENSIONAL VIRTUAL MODELS	

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1 — Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

● Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
Person to whom the inventor is obligated to assign.	Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	Align Technology, Inc.		
Mailing Address Information For Applicant:			
Address 1	2820 Orchard Parkway		
Address 2			
City	San Jose	**State/Province**	CA
Country	US	Postal Code	95134
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	22773-822.303
	Application Number	16/586,528
Title of Invention	~~METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS~~ METHODS AND SYSTEMS FOR CREATING AND INTERACTING WITH THREE DIMENSIONAL VIRTUAL MODELS	

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add

Signature:

Remove

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Garrett Potter/			Date (YYYY-MM-DD)	2020-04-20
First Name	Garrett	Last Name	Potter	Registration Number	76602

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	22773-822.303
		Application Number	16/586,528
Title of Invention	~~METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS~~ METHODS AND SYSTEMS FOR CREATING AND INTERACTING WITH THREE DIMENSIONAL VIRTUAL MODELS		

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1 The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3 A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent CooperationTreaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

UNITED STATES PATENT AND TRADEMARK OFFICE

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United States Patent and Trademark Office
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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
16/586,528	09/27/2019		1720	22773-822.303	20	3

CONFIRMATION NO. 9600

107046
WSGR / Align Technology , Inc.
650 Page Mill Road
Palo Alto, CA 94304

FILING RECEIPT

OC000000011605641

Date Mailed: 10/15/2019

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

Avi Kopelman, Palo Alto, CA;

Applicant(s)

Align Technology, Inc., San Jose, CA;

Power of Attorney: The patent practitioners associated with Customer Number 107046

Domestic Priority data as claimed by applicant

This application is a CON of 15/050,673 02/23/2016
which is a CON of 13/574,723 01/04/2013 PAT 9299192
which is a 371 of PCT/IL11/00574 07/19/2011
which claims benefit of 61/365,556 07/19/2010

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 10/10/2019
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/586,528**
Projected Publication Date: 01/23/2020
Non-Publication Request: No
Early Publication Request: No
Title METHODS AND SYSTEMS FOR CREATING AND INTERACTING WITH THREE DIMENSIONAL VIRTUAL MODELS
~~METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS~~

Preliminary Class

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

I hereby certify that this correspondence is being filed via EFS-Web with the United States Patent and Trademark Office on April 21, 2020

WILSON SONSINI GOODRICH & ROSATI

By: /Hillary Pratt/

Attorney Docket No.: 22773-822.303
Client Ref. No.: 7034.WO.US.C1.C2

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Confirmation No.: 9600
Avi Kopelman	
Application No.: 16/586,528	Examiner: BIJAN MAPAR
Filed: September 27, 2019	Art Unit: 2128
For: METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS	REQUEST FOR CORRECTED FILING RECEIPT
Customer No.: 107046	

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

Attached is a copy of the official Filing Receipt received from the United States Patent and Trademark Office in the above-referenced application for which issuance of a Corrected Filing Receipt is respectfully requested.

This Request for Corrected Filing Receipt is being made to correct the title as follows:

Incorrect:

~~METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS~~

Correct:

METHODS AND SYSTEMS FOR CREATING AND INTERACTING WITH THREE DIMENSIONAL VIRTUAL MODELS

Applicant additionally submits herewith a properly signed and marked-up Application Data Sheet.

Although Applicant believes no fee is due, the Commissioner is hereby authorized to charge any additional fees associated with this paper or during the pendency of this application, or credit any overpayment, to Deposit Account No. 23-2415.

Respectfully submitted,

Dated: April 20, 2020

/Garrett Potter/

Garrett Potter
Registration No. 76,602

WILSON SONSINI GOODRICH & ROSATI
650 Page Mill Road
Palo Alto, CA 94304-1050
Tel: 650-493-9300
Fax 650-493-6811

ClearCorrect Exhibit 1002, Page 317 of 437

PTO/AIA/80 (07-17)
Approved for use through 01/31/2018. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

[X] Practitioners associated with Customer Number: 107046

OR

[ ] Practitioner(s) named below (If more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

[X] The address associated with Customer Number: 107046

OR

[ ]

Firm or individual name		
Address		
City	State	Zip
Country		
Telephone	Email	

Assignee name and address: Align Technology, Inc.
2820 Orchard Parkway
San Jose, California 95134

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of the practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee.

Signature	Date September 13, 2017
Name Arthur Hsieh	Telephone 408-470-1000
Title VP, Associate General Counsel, Intellectual Property & Licensing	

This collection of information is required by 37 CFR 1.31, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public, which is to update (and by the USPTO to process) the file of a patent or reexamination proceeding. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 18 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/AIA/96 (08-12)
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Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Align Technology, Inc.

Application No./Patent No.: 16/586,528 Filed/Issue Date: September 27, 2019

Titled: METHODS AND SYSTEMS FOR CREATING AND INTERACTING WITH THREE DIMENSIONAL VIRTUAL MODELS

Align Technology, Inc., a corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

B. ☑ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: AVI KOPELMAN To: ALIGN TECHNOLOGY, INC.

   The document was recorded in the United States Patent and Trademark Office at Reel 028827, Frame 0892, or for which a copy thereof is attached.

2. From: ALIGN TECHNOLOGY, INC. To: CADENT LTD.

   The document was recorded in the United States Patent and Trademark Office at Reel 029232, Frame 0709, or for which a copy thereof is attached.

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/AIA/96 (08-12)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: CADENT LTD. To: ALIGN TECHNOLOGY, INC.

The document was recorded in the United States Patent and Trademark Office at
Reel 034545, Frame 0470, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☑ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Garrett Potter/	April 20, 2020
Signature	Date
Garrett Potter	76602
Printed or Typed Name	Title or Registration Number

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
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UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/586,528	09/27/2019	Avi Kopelman	22773-822.303

CONFIRMATION NO. 9600

107046
WSGR / Align Technology , Inc.
650 Page Mill Road
Palo Alto, CA 94304

POA ACCEPTANCE LETTER

OC000000116443864

Date Mailed: 04/23/2020

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 04/21/2020.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/hsarwari/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
16/586,528	09/27/2019	2128	1720	22773-822.303	20	3

CONFIRMATION NO. 9600

CORRECTED FILING RECEIPT

107046
WSGR / Align Technology , Inc.
650 Page Mill Road
Palo Alto, CA 94304

OC000000116445726

Date Mailed: 04/23/2020

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

Avi Kopelman, Palo Alto, CA;

Applicant(s)

Align Technology, Inc., San Jose, CA;

Power of Attorney: The patent practitioners associated with Customer Number 107046

Domestic Priority data as claimed by applicant

This application is a CON of 15/050,673 02/23/2016
which is a CON of 13/574,723 01/04/2013 PAT 9299192
which is a 371 of PCT/IL11/00574 07/19/2011
which claims benefit of 61/365,556 07/19/2010

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 10/10/2019

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/586,528**

Projected Publication Date: Not Applicable

Non-Publication Request: No

Early Publication Request: No

Title

METHODS AND SYSTEMS FOR CREATING AND INTERACTING WITH THREE DIMENSIONAL VIRTUAL MODELS

Preliminary Class

703

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific

countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop

technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

107046 7590 04/08/2020
WSGR / Align Technology , Inc.
650 Page Mill Road
Palo Alto, CA 94304

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

Hillary Pratt	(Typed or printed name)
/Hillary Pratt/	(Signature)
April 24, 2020	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/586,528	09/27/2019	Avi Kopelman	22773-822.303	9600

TITLE OF INVENTION: METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1000	$0.00	$0.00	$1000	07/08/2020

EXAMINER	ART UNIT	CLASS-SUBCLASS
MAPAR, BIJAN	2128	703-001000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Wilson Sonsini Goodrich & Rosati
2
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: Align Technology, Inc.

(B) RESIDENCE: (CITY and STATE OR COUNTRY): San Jose, CA

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ☒ Corporation or other private group entity ❑ Government

4a. Fees submitted: ☒ Issue Fee ❑ Publication Fee (if required) ❑ Advance Order - # of Copies _____

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

☒ Electronic Payment via EFS-Web ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. 23-2415

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

❑ Applicant asserting small entity status. See 37 CFR 1.27

❑ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /Garrett Potter/ Date April 23, 2020

Typed or printed name Garrett Potter Registration No. 76602

ClearCorrect Exhibit 1002, Page 328 of 437

Electronic Patent Application Fee Transmittal	
Application Number:	16586528
Filing Date:	27-Sep-2019
Title of Invention:	METHODS AND SYSTEMS FOR CREATING AND INTERACTING WITH THREE DIMENSIONAL VIRTUAL MODELS
First Named Inventor/Applicant Name:	Avi Kopelman
Filer:	Garrett T Potter/Hillary Pratt
Attorney Docket Number:	22773-822.303
Filed as Large Entity	
Filing Fees for Utility under 35 USC 111(a)	

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
UTILITY APPL ISSUE FEE	1501	1	1000	1000

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**1000**

Electronic Acknowledgement Receipt	
EFS ID:	39255525
Application Number:	16586528
International Application Number:	
Confirmation Number:	9600
Title of Invention:	METHODS AND SYSTEMS FOR CREATING AND INTERACTING WITH THREE DIMENSIONAL VIRTUAL MODELS
First Named Inventor/Applicant Name:	Avi Kopelman
Customer Number:	107046
Filer:	Garrett T Potter/Hillary Pratt
Filer Authorized By:	Garrett T Potter
Attorney Docket Number:	22773-822.303
Receipt Date:	24-APR-2020
Filing Date:	27-SEP-2019
Time Stamp:	12:27:12
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$1000
RAM confirmation Number	E20204NC27433274
Deposit Account	232415
Authorized User	Hillary Pratt
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	22773_822_303_IssueFeeTransmittal.pdf	99066 1dde1dc59674310bfc329bc78a76b1c55741cac4	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30418 0476dfed1226017184c84019362ffce032d81956	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	129484		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82A (07-13)
Approved for use through 01/31/2018. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	16/586,528 Conf. 9600
Filing Date	September 27, 2019
First Named Inventor	Avi Kopelman
Title	METHODS AND SYSTEMS FOR CREATING AND INTERACTING WITH THREE DIMENSIONAL VIRTUAL MODELS
Art Unit	2128
Examiner Name	Mapar, Bijan
Attorney Docket Number	11353.025US4

SIGNATURE of Applicant or Patent Practitioner

Signature	/Charles C. Hagadorn, III/	Date (Optional)	
Name	Charles C. Hagadorn, III	Registration Number	62367
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

☑ *Total of 2 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82B (07-13)
Approved for use through 01/31/2016. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number

POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

☑ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 161191

OR

☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

☑ The address associated with the above-mentioned Customer Number

OR

☐ The address associated with Customer Number:

OR

☐ Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

Align Technology, Inc.

☐ Inventor or Joint Inventor (title not required below)

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

☑ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature		Date (Optional)	
Name	Arthur S. Hsieh		
Title	Vice President, Intellectual Property & Licensing		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

☑ Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Electronic Acknowledgement Receipt	
EFS ID:	39499105
Application Number:	16586528
International Application Number:	
Confirmation Number:	9600
Title of Invention:	METHODS AND SYSTEMS FOR CREATING AND INTERACTING WITH THREE DIMENSIONAL VIRTUAL MODELS
First Named Inventor/Applicant Name:	Avi Kopelman
Customer Number:	107046
Filer:	Charles C. Hagadorn III/Jayna Lofgran
Filer Authorized By:	Charles C. Hagadorn III
Attorney Docket Number:	22773-822.303
Receipt Date:	20-MAY-2020
Filing Date:	27-SEP-2019
Time Stamp:	18:43:30
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	11353-025US4_Transmittal-and-POA_200520.pdf	1285539 bd43d0084bb7147ba1455a10afb7d6d0185d3346	no	2
Warnings:					

Information:	
Total Files Size (in bytes):	1285539

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/586,528	09/27/2019	Avi Kopelman	11353.025US4

CONFIRMATION NO. 9600

161191
FisherBroyles, LLP - Align Technology, Inc.
945 East Paces Ferry Road NE
Suite 2000
Atlanta, GA 30326

POA ACCEPTANCE LETTER

OC000000117179441

Date Mailed: 05/26/2020

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 05/20/2020.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/mbekele nedy/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/586,528	09/27/2019	Avi Kopelman	22773-822.303

CONFIRMATION NO. 9600

107046
WSGR / Align Technology , Inc.
650 Page Mill Road
Palo Alto, CA 94304

POWER OF ATTORNEY NOTICE

OC000000117179415

Date Mailed: 05/26/2020

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 05/20/2020.

- The Power of Attorney to you in this application has been revoked by the applicant. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/mbekele nedy/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/586,528	09/27/2019	Avi Kopelman	11353.025US4	9600

161191 7590 05/27/2020

FisherBroyles, LLP - Align Technology, Inc.
945 East Paces Ferry Road NE
Suite 2000
Atlanta, GA 30326

EXAMINER	
MAPAR, BIJAN	

ART UNIT	PAPER NUMBER
2128	

NOTIFICATION DATE	DELIVERY MODE
05/27/2020	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docketing@fisherbroyles.com
patent@fisherbroyles.com

Response to Rule 312 Communication	Application No.	Applicant(s)	
	16/586,528	Kopelman, Avi	
	Examiner	Art Unit	AIA (FITF) Status
	BIJAN MAPAR	2128	No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

1. ☑ The amendment filed on 22 April 2020 under 37 CFR 1.312 has been considered, and has been:

a) ☐ entered.

b) ☑ entered as directed to matters of form not affecting the scope of the invention.

c) ☐ disapproved because the amendment was filed after the payment of the issue fee.

Any amendment filed after the date the issue fee is paid must be accompanied by a petition under 37 CFR 1.313(c)(1) and the required fee to withdraw the application from issue.

d) ☐ disapproved. See explanation below.

e) ☐ entered in part. See explanation below.

———

/BIJAN MAPAR/
Primary Examiner, Art Unit 2128

I hereby certify that this correspondence is being filed via EFS-Web with the United States Patent and Trademark Office on April 21, 2020

WILSON SONSINI GOODRICH & ROSATI

By: /Hillary Pratt/

Attorney Docket No.: 22773-822.303
Client Ref. No.: 7034.WO.US.C1.C2

OK TO ENTER: /B.M/

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Confirmation No. 9600
Avi Kopelman	
Application No.: 16/586,528	Examiner: Bijan Mapar
Filed: September 27, 2019	Art Unit: 2128
For: METHODS AND SYSTEMS FOR PREPARATION OF ORTHODONTICS AND PROSTODONTICS	AMENDMENT AFTER ALLOWANCE UNDER 37 C.F.R 1.312
Customer No. 107046	

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

Prior to issuance of the patent, Applicant respectfully requests entry of this amendment under 37 C.F.R. 1.312 for the above-captioned patent application.

Amendments to the Specification begin on page 2.

Amendments to the Claims are reflected in the listing of claims beginning on page 3.

Remarks begin on page 8.

Doc code: RCEX
Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

Application Number	16/586,528	Filing Date	2019-09-27	Docket Number (if applicable)	11353.025US4	Art Unit	2128
First Named Inventor	Avi Kopelman			Examiner Name	Mapar, Bijan		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

- ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____
- ☐ Other _____

☒ Enclosed

- ☐ Amendment/Reply
- ☒ Information Disclosure Statement (IDS)
- ☐ Affidavit(s)/ Declaration(s)
- ☐ Other _____

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____
(Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

FEES

☒ **The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**
The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 506974

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

Applicant Signature

EFS - Web 2.1.16

PTO/SB/30EFS (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Signature of Registered U.S. Patent Practitioner			
Signature	/Charles C. Hagadorn, III/	Date (YYYY-MM-DD)	2020-05-29
Name	Charles C. Hagadorn, III	Registration Number	62367

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal	
Application Number:	16586528
Filing Date:	27-Sep-2019
Title of Invention:	METHODS AND SYSTEMS FOR CREATING AND INTERACTING WITH THREE DIMENSIONAL VIRTUAL MODELS
First Named Inventor/Applicant Name:	Avi Kopelman
Filer:	Charles C. Hagadorn III/Jayna Lofgran
Attorney Docket Number:	11353.025US4
Filed as Large Entity	

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
PETITION FEE- 37 CFR 1.17(H) (GROUP III)	1464	1	140	140
RCE- 1ST REQUEST	1801	1	1300	1300
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**1440**

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

Decision Date : May 29, 2020

In re Application of :

Avi Kopelman

DECISION ON PETITION
UNDER CFR 1.313(c)(2)

Application No : 16586528

Filed : 27-Sep-2019

Attorney Docket No : 11353.025US4

This is an electronic decision on the petition under 37 CFR 1.313(c)(2), filed May 29, 2020 , to withdraw the above-identified application from issue after payment of the issue fee.

The petition is **GRANTED.**

The above-identified application is withdrawn from issue for consideration of a submission under 37 CFR 1.114 (request for continued examination). See 37 CFR 1.313(c)(2).

Petitioner is advised that the issue fee paid in this application cannot be refunded. If, however, this application is again allowed, petitioner may request that it be applied towards the issue fee required by the new Notice of Allowance.

Telephone inquiries concerning this decision should be directed to the Patent Electronic Business Center (EBC) at 866-217-9197.

This application file is being referred to Technology Center AU 2128 for processing of the request for continuing examination under 37 CFR 1.114 .

Office of Petitions

Electronic Acknowledgement Receipt	
EFS ID:	39580917
Application Number:	16586528
International Application Number:	
Confirmation Number:	9600
Title of Invention:	METHODS AND SYSTEMS FOR CREATING AND INTERACTING WITH THREE DIMENSIONAL VIRTUAL MODELS
First Named Inventor/Applicant Name:	Avi Kopelman
Customer Number:	161191
Filer:	Charles C. Hagadorn III/Jayna Lofgran
Filer Authorized By:	Charles C. Hagadorn III
Attorney Docket Number:	11353.025US4
Receipt Date:	29-MAY-2020
Filing Date:	27-SEP-2019
Time Stamp:	18:36:19
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$1440
RAM confirmation Number	E20205SI36145573
Deposit Account	506974
Authorized User	Jayna Lofgran
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Quick Path Information Disclosure Statement	11353-025US4_sb0009_QPIDS_200529.pdf	173549 8bcb8a212b1ca88fbe7dd5f964c4b934effc3a92	no	1
Warnings:					
Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	11353-025US4_SyncIDS-Form.pdf	43924 f5776f0ce3b6457fee12a669c47675024129 1dd1	no	1
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Non Patent Literature	11353-025US4-NPL-001.pdf	378319 ee6cea249fc1f98b317771441a5cd6c51339c823	no	2
Warnings:					
Information:					
4	Transmittal Letter	11353-025US4_Transmittal-Letter.pdf	511581 985fbf255e3b998d6bd80d569dfd5ee17dfed601	no	1
Warnings:					
Information:					
5	Petition automatically granted by EFS	petition-request.pdf	31649 f672c09f116ab2ac1e8bc6ea1cdb1909b2887208	no	2
Warnings:					
Information:					
6	Request for Continued Examination (RCE)	11353-025US4_sb0030efs_RCE_200529.pdf	1349946 aebb2799ae2f229478166ec4b09c13cbe5ec704d	no	3
Warnings:					

Information:					
7	Fee Worksheet (SB06)	fee-info.pdf	32401 a09c2d59191b2dda90bac83cf7455bc2d290b28e	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	2521369	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Doc Code: QPIDS.REQ
Document Description: QuickPath Information Disclosure Statement

PTO/SB/09 (09-18)

CERTIFICATION AND REQUEST FOR CONSIDERATION OF AN INFORMATION DISCLOSURE STATEMENT FILED AFTER PAYMENT OF THE ISSUE FEE UNDER THE QPIDS PROGRAM

Non-Provisional Application Number: 16/586,528	Filing Date: 09/27/2019
First Named Inventor: Avi Kopelman	Title of Invention: METHODS AND SYSTEMS FOR CREATING AND INTERACTING WITH THREE DIMENSIONAL VIF

THE UNDERSIGNED HEREBY CERTIFIES AND REQUESTS THE FOLLOWING FOR THE ABOVE-IDENTIFIED APPLICATION.

1. Consideration is requested of the information disclosure statement (IDS) submitted herewith, which is being filed after payment of the issue fee.
2. Check the box next to the appropriate selection:

   ☐ Each item of information contained in the IDS was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the IDS. See 37 CFR 1.97(e)(1).

   OR

   ☑ No item of information contained in the IDS was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the IDS was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the IDS. See 37 CFR 1.97(e)(2).

   OR

   ☐ See attached certification statement in compliance with 37 CFR 1.97(e).
3. Please charge the IDS fee set forth in 37 CFR 1.17(p) to Deposit Account No. 506974.
4. A Petition to Withdraw from Issue After Payment of the Issue Fee (37 CFR 1.313(c)(2)), including the petition fee set forth in 37 CFR 1.17(h), is submitted herewith as a **Web-based ePetition**. **WARNING:** Do not submit the petition as a follow-on paper via EFS-Web. Submit the petition as a Web-based ePetition by signing on to EFS-Web as a registered user, selecting the radio button next to "Existing application/patent," and then selecting the radio button next to "ePetition (for automatic processing and immediate grant, if all petitions requirements are met)." Failure to use the Web-based ePetition interface will result in automatic entry of the RCE.
5. A request for continued examination (RCE) under 37 CFR 1.114 and the RCE fee under 37 CFR 1.17(e) are submitted herewith.
6. The RCE will be treated as a "conditional" RCE. In the event the examiner determines that any item of information contained in the IDS necessitates the reopening of prosecution in the application, the undersigned understands that (i) the RCE will be processed and treated as an RCE under 37 CFR 1.114 and therefore (ii) the IDS fee under 37 CFR 1.17(p) will be returned in accordance with 37 CFR 1.97(b)(4). In the event that no item of information in the IDS necessitates reopening prosecution, the undersigned understands that the RCE will not be processed and the RCE fee under 37 CFR 1.17(e) will be returned.
7. This certification and request is being filed as a **Web-based ePetition** and is not accompanied by an amendment to the application. Inclusion of an amendment will result in automatic entry of the RCE.

Signature /Charles C. Hagadorn, III/	Date 05/29/2020
Name (Print/Typed) Charles C. Hagadorn, III	Practitioner Registration Number (If applicable) 62367

Note: *Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required in accordance with 37 CFR 1.33 and 11.18. Please see 37 CFR 1.4(d) for the form of the signature. If necessary, submit multiple forms for more than one signature, see below.**

☑ *Total of 2 forms are submitted.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT		
	Application Number	16/586,528
	Filing Date	09/27/2019
	First Named Inventor	Avi Kopelman
	Art Unit	2128
	Client Number	11353
Page 1 of 1	**Matter Number**	025US4

U.S. PATENT/PUBLICATION DOCUMENTS					
Initials	**Cite No.**	**Document Number**	**Issue/Publication Date**	**First Named Inventor**	**Relevant Pages, Columns, etc.**

FOREIGN PATENT DOCUMENTS						
Initials	**Cite No.**	**Document Number**	**Publication Date**	**Country**	**Relevant Pages, Columns, etc.**	**T**

OTHER DOCUMENTS			
Initials	**Cite No.**	**Author, Title, Date, Pages, etc.**	**T**
	1	Notice of Issuance of Initial Determination on Violation of Section 337 with Recommendation on Remedy and Bond, in the matter of Certain Dental and Orthodontic Scanners and Software, Inv. No. 337-TA-1144 (April 30, 2020).	

Examiner Signature		**Date Considered**	

Examiner: Please initial if citation considered, whether or not citation is in conformance with MPEP Section 609. Please draw a line through the citation if it is not in conformance and it is not considered. Please include a copy of this form with the next communication to the applicant.

SyncIDS.com

INFORMATION DISCLOSURE STATEMENT BY APPLICANT		
	Application Number	16/586,528
	Filing Date	09/27/2019
	First Named Inventor	Avi Kopelman
	Art Unit	2128
	Client Number	11353
Page 1 of 1	**Matter Number**	025US4

GENERAL

Pursuant to 37 C.F.R. 1.97 and 1.98 and to the duty of disclosure set forth in 37 C.F.R. 1.56, the Examiner in charge of the above-identified application is requested to consider and make of record the references listed herewith. A copy of each listed reference, other than U.S. patents/applications and references cited in a parent application, is enclosed.

Although the information submitted herewith may be "material" to the Examiner's consideration of the subject application, this submission is not intended to constitute an admission that such information is "prior art" as to the claimed invention.

In accordance with 37 C.F.R. 1.97(g), the filing of this Information Disclosure Statement shall not be construed to mean that a search has been made.

CERTIFICATION STATEMENT

No item of information contained in this information disclosure statement was cited in any communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in this information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of this information disclosure statement.

FEE

This Information Disclosure Statement is being filed in accordance with 37 CFR 1.97(d). Therefore, this Information Disclosure Statement is subject to the $240 (large entity) fee set forth in 37 CFR 1.17(p).

ADDITIONAL COMMENTS

SIGNATURE

Signature	/ Charles C. Hagadorn, III /	**Date**	2020-05-29
Name	Charles C. Hagadorn, III	**Registration Number**	62367

SyncIDS.com

Doc Code: PET.AUTO Document Description: Petition automatically granted by EFS-Web	PTO/SB/140 U.S. Patent and Trademark Office Department of Commerce

Electronic Petition Request	**PETITION TO WITHDRAW AN APPLICATION FROM ISSUE AFTER PAYMENT OF THE ISSUE FEE UNDER 37 CFR 1.313(c)**
Application Number	16586528
Filing Date	27-Sep-2019
First Named Inventor	Avi Kopelman
Art Unit	2128
Examiner Name	BIJAN MAPAR
Attorney Docket Number	11353.025US4
Title	METHODS AND SYSTEMS FOR CREATING AND INTERACTING WITH THREE DIMENSIONAL VIRTUAL MODELS

An application may be withdrawn from issue for further action upon petition by the applicant. To request that the Office withdraw an application from issue, applicant must file a petition under this section including the fee set forth in § 1.17(h) and a showing of good and sufficient reasons why withdrawal of the application from issue is necessary.

APPLICANT HEREBY PETITIONS TO WITHDRAW THIS APPLICATION FROM ISSUE UNDER 37 CFR 1.313(c).

A grantable petition requires the following items:
(1) Petition fee; and
(2) One of the following reasons:
(a) Unpatentability of one or more claims, which must be accompanied by an unequivocal statement that one or more claims are unpatentable, an amendment to such claim or claims, and an explanation as to how the amendment causes such claim or claims to be patentable;
(b) Consideration of a request for continued examination in compliance with § 1.114 (for a utility or plant application only); or
(c) Express abandonment of the application. Such express abandonment may be in favor of a continuing application, but not a CPA under 37 CFR 1.53(d).

Petition Fee

- ○ Small Entity
- ○ Micro Entity
- ◉ Regular Undiscounted

Reason for withdrawal from issue

○ One or more claims are unpatentable ◉ Consideration of a request for continued examination (RCE) (List of Required Documents and Fees) ○ Applicant hereby expressly abandons the instant application (any attorney/agent signing for this reason must have power of attorney pursuant to 37 CFR 1.32(b)).
RCE request,submission, and fee. ☐ I certify, in accordance with 37 CFR 1.4(d)(4) that : The RCE request ,submission, and fee have already been filed in the above-identified application on ☒ Are attached.
THIS PORTION MUST BE COMPLETED BY THE SIGNATORY OR SIGNATORIES I certify, in accordance with 37 CFR 1.4(d)(4) that I am: ◉ An attorney or agent registered to practice before the Patent and Trademark Office who has been given power of attorney in this application. ○ An attorney or agent registered to practice before the Patent and Trademark Office, acting in a representative capacity. ○ A sole inventor ○ A joint inventor; I certify that I am authorized to sign this submission on behalf of all of the inventors as evidenced by the power of attorney in the application ○ A joint inventor; all of whom are signing this e-petition

Signature	/Charles C. Hagadorn, III/
Name	Charles C. Hagadorn, III
Registration Number	62367



United States Patent and Trademark Office

Office of the Chief Financial Officer

Document Code:WFEE

User :66043

Sale Accounting Date:06/01/2020

Sale Item Reference Number	Effective Date
16586528	05/29/2020

Document Number	Fee Code	Fee Code Description	Amount Paid	Payment Method
I20205TD03020332	1806	SUBMISSION- INFORMATION DISCLOSURE STMT	$240.00	Deposit Account