

Señores:

**SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
DIVISIÓN DE NUEVAS CREACIONES
CIUDAD**

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



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Act. 444 RESPUESTAREQUE Folios: 7

REF: Expediente: No. 2001-84148
Patente: UNA EVALUACION DENTAL, UN APARATO DISPENSADOR, UN SISTEMA Y METODO PARA PROPORCIONAR LA MISMA
Trámite: 002
Oficio: 16050
Titular: ORTHO TAIN, INC.
Contador: 11164

Asunto: RESPUESTA OFICIO No. 16050 NOTIFICADO EN LISTA DE FECHA 18 DE DICIEMBRE DE 2008

ANNIE ROSAS MARKEN, identificada como aparece al pie de mi firma, abogada en ejercicio, portadora de la Tarjeta Profesional No. 152.306 C.S. de la J., actuando como apoderada de la sociedad ORTHO TAIN, INC., de conformidad con la sustitución del poder que adjunto, por medio del presente escrito me permito dar respuesta al Oficio No. 16050 notificado mediante fijación en lista el 18 de diciembre de 2008, con base en los siguientes términos:

FUNDAMENTOS DE HECHO

1. El 2 de Octubre de 2001 la Sociedad ORTHO TAIN, INC., solicitó la patente de invención denominada, UNA EVALUACION DENTAL, UN APARATO DISPENSADOR, UN SISTEMA Y UN MÉTODO PARA PROPORCIONAR LA MISMA.
2. El 20 de Diciembre del 2001 la Superintendencia de Industria y Comercio emitió el oficio No. 3219.
3. El 19 de Febrero del 2002, se respondió al oficio antes mencionado aclarando, entre otros, el título de la invención, quedando en adelante como UN APARATO PARA PROPORCIONAR UNA EVALUACIÓN DEL ESTADO ORTODONTICO DE UN USUARIO Y SISTEMA QUE LO UTILIZA.
4. El 31 de Julio del 2003 la solicitud fue publicada en la Gaceta de la Propiedad Industrial No. 530, página 443, publicación 516.

5. El 26 de Septiembre del 2003 se canceló la suma de TRESCIENTOS TREINTA Y CINCO MIL Pesos M/Cte. (\$ 335.000.00), con el fin de que se realizara el correspondiente Examen de Patentabilidad.
6. El 23 de agosto del 2007 por medio de fijación en lista, la Superintendencia de Industria y Comercio emitió el oficio No. 10102.
7. El 15 de Noviembre del 2007, se solicitó una prórroga adicional de treinta (30) días para dar respuesta al oficio No. 10102 del 2007, de conformidad con el Artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina.
8. El 20 de diciembre de 2008, se dio respuesta al oficio No. 10102 notificado mediante fijación en lista de 23 de agosto de 2007
9. El 18 de diciembre de 2008 por medio de fijación en lista, la Superintendencia de Industria y Comercio emitió el oficio No. 16050.
10. El 17 de marzo de 2009, se solicitó una prórroga adicional de treinta (30) días para dar respuesta al oficio No. 16050 del 2008, de conformidad con el Artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina.

Teniendo en cuenta lo anterior y en tiempo oportuno, me permito dar repuesta al oficio No. 16050 del 2008, en los siguientes términos:

1. Acompaño nuevas reivindicaciones las cuales distinguen la invención de la patente US No. 5,278,756 y además definen de manera clara el objeto inventivo de la patente solicitada denominada UN APARATO PARA PROPORCIONAR UNA EVALUACIÓN DEL ESTADO ORTODÓNTICO DE UN USUARIO Y SISTEMA QUE LO UTILIZA.
 - Con las nuevas reivindicaciones 1 a 9 queda definido un aparato novedoso frente a la patente US 5.278.756 (D1), en la cual se generan cefalogramas para ubicar métricos como expresa el informe del examinador. Más próximo al presente invento se encuentra la patente US 5.882.192 (D2) que toma múltiples imágenes de la boca para diagnosticar el estado ortodontológico del paciente y utiliza intervalos de medidas para determinar si las dimensiones de los dientes están fuera de límites aceptables.
 - Pero ninguno de estos documentos prevé mecanismo de enfoque alguno que dirija el dispositivo de captura de imágenes hacia una porción de la dentadura del paciente. Todo lo contrario, esos antecedentes toman múltiples imágenes; el D2 menciona que es necesario que la máquina fotográfica tome varias fotografías estáticas desde diversos ángulos o bien varias imágenes digitales en video continuo de la cara y dientes del paciente, debiendo las imágenes incluir vistas oclusales así como superficiales labiales y bucales de los dientes (col. 4, renglones 44 a 53).

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- Las nuevas reivindicaciones solucionan también cuestiones formales informadas por el examinador, en particular en cuanto a la extensión del pliego y cantidad de independientes. Con la nueva lámina de dibujos se remedia el faltante mencionado en el informe de examen relativo a la extraña ausencia de las figs. 1 y 2.

Cabe mencionar que las nuevas reivindicaciones corresponden a un juego aceptado por la oficina europea de patentes en el trámite N° 01977582.4.

Respetuosamente solicito a Ustedes tener en cuenta lo antes mencionado, así como las nuevas reivindicaciones para dar por satisfactoriamente respondido el oficio No. 15060 del 2008 y continuar con el trámite de solicitud de la patente de invención denominada UN APARATO PARA PROPORCIONAR UNA EVALUACION DEL ESTADO ORTODONTICO DE UN USUARIO Y SISTEMA QUE LO UTILIZA.

Para tal efecto

ANEXO

1. Con la nueva lámina de dibujos se remedia el faltante mencionado en el informe de examen relativo a la extraña ausencia de las figuras 1 y 2.
2. Nuevas reivindicaciones 1 a 9
3. Copia auténtica de la sustitución de poder a la Doctora Carolina Mercedes Daza Montalvo identificada con la Cedula de Ciudadanía No. C.C. 66.783.790 de Palmira (Valle), a la Doctora Annie Rosas Marken identificada con la Cédula de Ciudadanía No. C.C. 52.931.999 de Bogotá.

NOTIFICACIONES

Recibiremos notificaciones en la Secretaría de su Despacho y en mi oficina de la Calle 105A No. 14 - 76, Teléfono 6200527, Fax 214 1382 en Bogotá, D.C.

Atentamente,

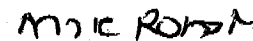

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FIG. 1

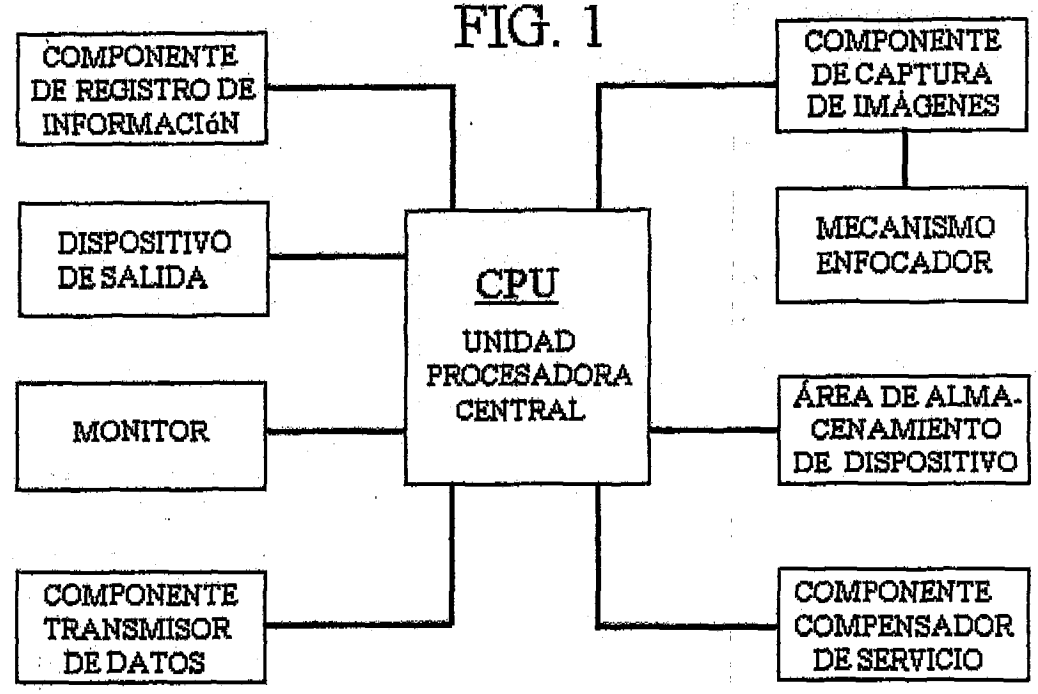
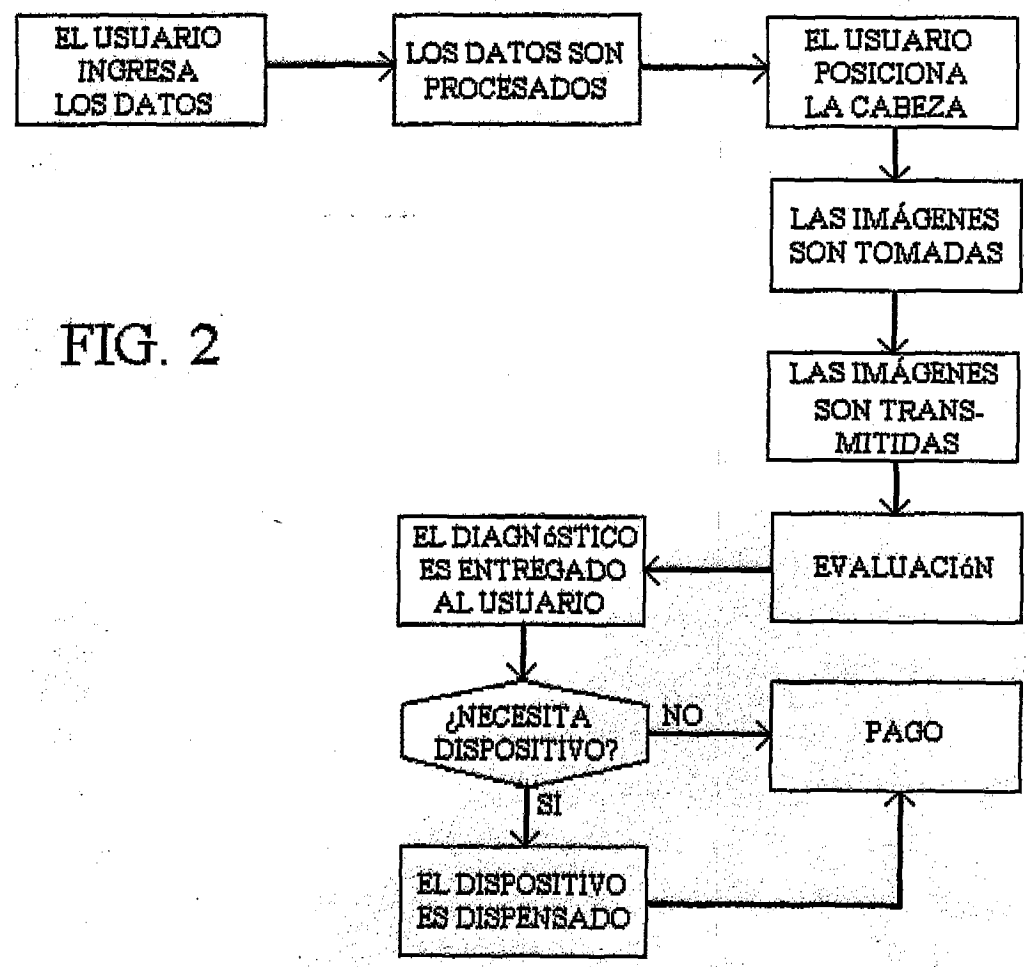


FIG. 2



REIVINDICACIONES:

- 1. Un aparato para proveer un diagnóstico del estado ortodóntico de un usuario y dispensar uno de una pluralidad de dispositivos dentales de diferentes tamaños usados en la boca del usuario, comprendiendo el aparato:**

un dispositivo de captura de imágenes para producir una señal indicativa de una imagen de una porción de la boca del usuario obtenida entre una línea media de una serie de dientes del usuario y una porción posterior del interior de la boca del usuario;

un mecanismo de enfoque conectado al dispositivo de captura de imágenes y que dirige al dispositivo de captura de imágenes para obtener la imagen de la porción de la boca del usuario; y

una unidad de procesamiento central cargada con datos referidos a condiciones ortodónticas y conectada de modo de recibir del dispositivo de captura de imágenes la señal indicativa de la imagen de una porción de la boca del usuario para clasificar la señal recibida según una pluralidad de estados ortodónticos definidos por intervalos dentro de una condición ortodóntica y que comprenden una dentadura temprana, una mixta y un caso adulto, dispensándose uno de los dispositivos dentales de diferentes tamaños por condición ortodóntica del usuario.

- 2. El aparato de la reivindicación 1, el cual comprende, además: un dispositivo de salida conectado a la unidad de procesamiento central para transmitir una comunicación verbal correspondiente al diagnóstico del estado ortodóntico del usuario.**

- 3. El aparato de la reivindicación 1, el cual comprende, además, un dispositivo de entrada conectado a la unidad de procesamiento central para aceptar información y transmitirla a la unidad de procesamiento central.**

4. El aparato de la reivindicación 1, el cual comprende, además, un componente de remuneración de servicios para recibir el pago del usuario y transmitir a la unidad de procesamiento central que el pago fue recibido.

5. El aparato de la reivindicación 1, en el cual la unidad de procesamiento central está localizada remotamente del dispositivo de captura de imágenes.

6. El aparato de la reivindicación 1, el cual comprende, además, un dispositivo transmisor de datos que conecta a la unidad de procesamiento central con el dispositivo de captura de imágenes para transmitir la señal indicativa de la imagen de una porción de boca.

7. El aparato de la reivindicación 1, en el cual la unidad de procesamiento central está preparada para diagnosticar el estado ortodóntico del usuario en base a la distancia entre el mecanismo de enfoque y el usuario.

8. El aparato de la reivindicación 1, el cual comprende, además, una placa de material deformable que el dispositivo de captura de imágenes utiliza para obtener la imagen de una porción de boca.

9. El aparato de la reivindicación 1, el cual comprende, además, un área de almacenaje de dispositivos dentales localizado en forma remota al dispositivo de captura de imágenes y que está conectado a la unidad de procesamiento central y dispensa el dispositivo dental.

SUSTITUCION DE P O D E R

A: SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO - SIC

SUSTITUYE:

CAROLINA MERCEDES DAZA MONTALVO
Cédula de Ciudadanía No. 66.783.790 de Palmira
Tarjeta Profesional No. 141.563 del C.S. de la J.

Por medio del presente escrito **CONFIERO PODER** amplio y suficiente a la Doctora:

ANNIE ROSAS MARKEN
Cédula de Ciudadanía No. 52.931.999 de Bogotá
Tarjeta Profesional No. 152.306 del C.S. de la J.

Para que presente y/o continúe y lleve hasta su fin el trámite administrativo surtido ante su despacho, a favor de mi poderdante en el trámite de:

Expediente: 2001-84148

La apoderada queda ampliamente facultada para el cabal cumplimiento del presente mandato, así como para recibir notificaciones, renovar, ver expedientes, interponer recursos en caso de que se presenten; abonar todos los impuestos y efectuar cualquier otro pago determinado por la ley; para recibir documentos y valores; transigir, someter a árbitros; deslitar; sustituir el presente mandato y revocar dichas sustituciones y reasumirlo en los mismos términos en que aquí se le confiere, y en general, para tomar todas aquellas medidas que considere convenientes o necesarias para la defensa de los derechos e intereses que aquí se les confían.

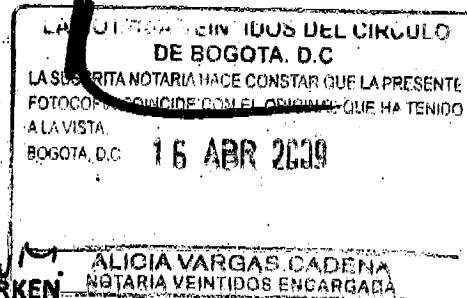
Sírvase reconocerle Personería Jurídica,

OTORGA:

Carolina Daza
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ACEPTA:

Annie Rosas Marken
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REPUBLICA DE COLOMBIA
NOTARIA VEINTIDOS DEL CIRCULO DE BOGOTA, D.C.
COMPARECENCIA PERSONAL Y AUTENTICACIÓN DE FIRMA
Art. 24 Decreto Ley 960 de 1978

La Notaria 22 del Circulo de Bogotá, D.C. da fe que el anterior escrito dirigido a:

fue presentado personalmente por

Carolina Mercedes Páez Palma de Ciudadanía

No. 66.783.790

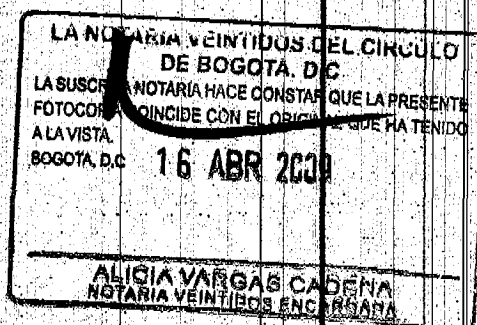
Profesional No. 141.563

Palmira y manifestó que la
firma y huella que aparecen en el presente documento son suyas y que acepta el contenido del mismo.

Cavalio Ojama

COMPARECIENTE 14 FEB 2000

BOGOTÁ, D.C.
NOTARIA 22 DEL CIRCULO DE BOGOTA, D.C.





US006093019A

United States Patent [19][11] **Patent Number:** **6,093,019****Morandi et al.**[45] **Date of Patent:** ***Jul. 25, 2000**[54] **DENTAL IMAGING SYSTEM WITH DIGITAL MOTION VIDEO**[75] **Inventors:** **James W. Morandi, Camarillo, Calif.; Douglas A. Golay, Coon Rapids, Iowa**[73] **Assignee:** **Integra Medical, Camarillo, Calif.**[*] **Notice:** This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).[21] **Appl. No.:** **08/996,982**[22] **Filed:** **Dec. 23, 1997**[51] **Int. Cl.⁷** **A61C 3/00**[52] **U.S. Cl.** **433/29**[58] **Field of Search** **433/29, 229**[56] **References Cited****U.S. PATENT DOCUMENTS**

4,952,149 8/1990 Duret et al. 433/229

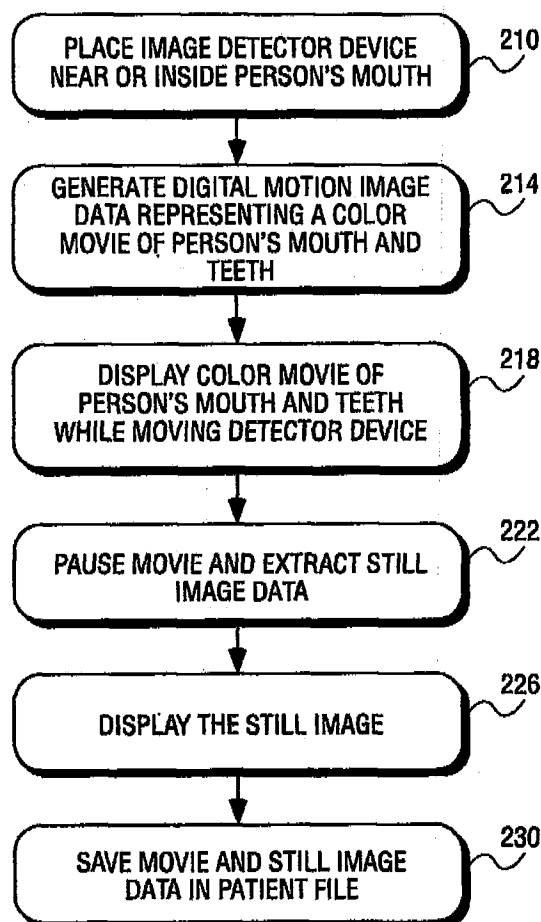
5,278,756	1/1994	Lemchen et al.	600/587
5,367,337	11/1994	Pyle et al.	348/521
5,661,519	8/1997	Franetzki	433/29
5,766,006	6/1998	Munljacic	433/26

Primary Examiner—John J. Wilson**Attorney, Agent, or Firm—Blakely Sokoloff Taylor & Zafman LLP**

[57]

ABSTRACT

A dental imaging system that extracts still images from a digital movie of a patient's mouth. The system allows still images free of shakes or flutter to be taken using an intraoral camera at the desired angle more easily than using conventional still image capture systems which may require several retakes before realizing a flutter-free image at the correct angle. Another embodiment uses image processing techniques, including color filtering and edge detection, to automatically and rapidly detect teeth in an image of a patient's mouth, without having to manually define the outline of each tooth.

10 Claims, 6 Drawing Sheets

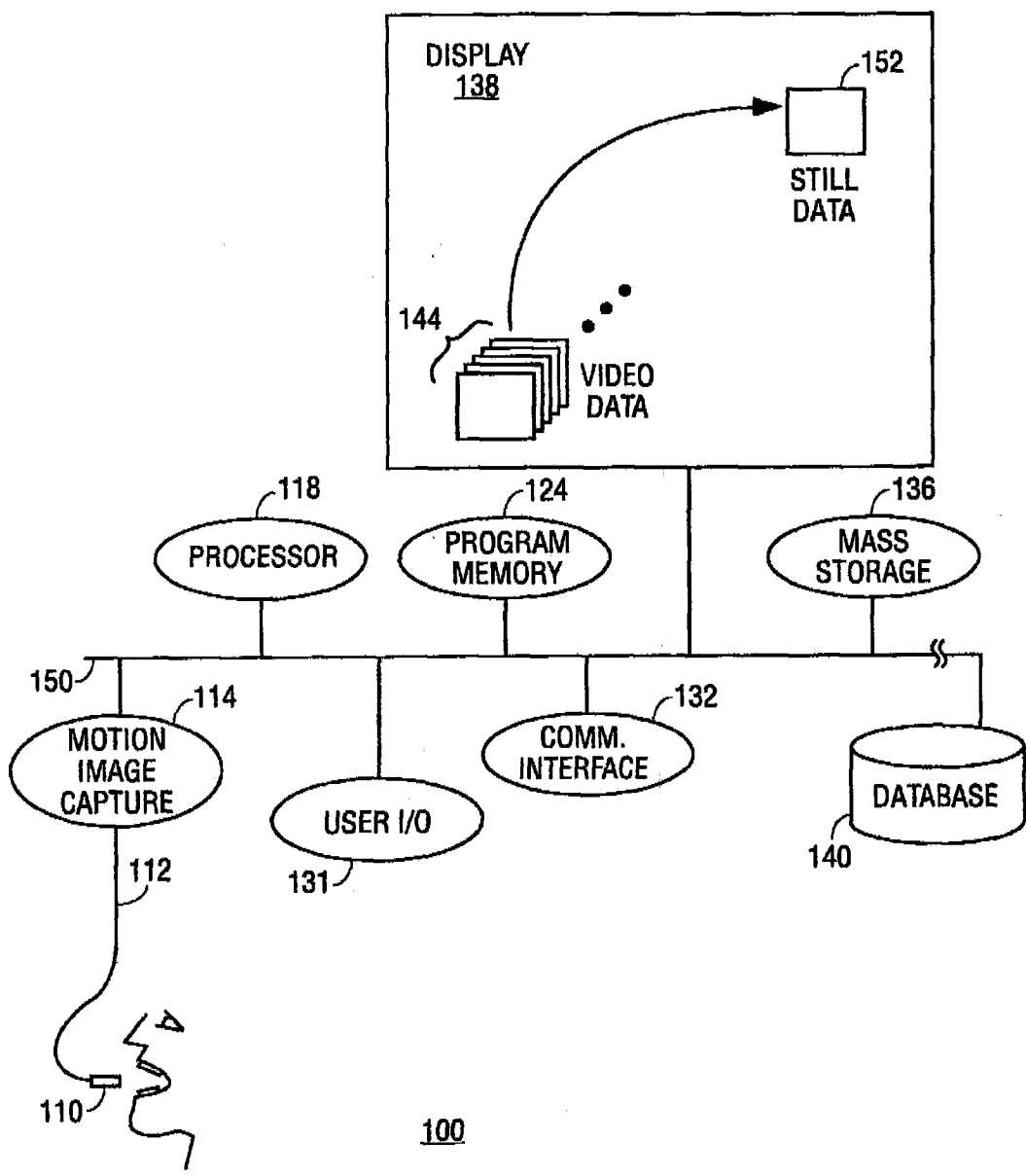
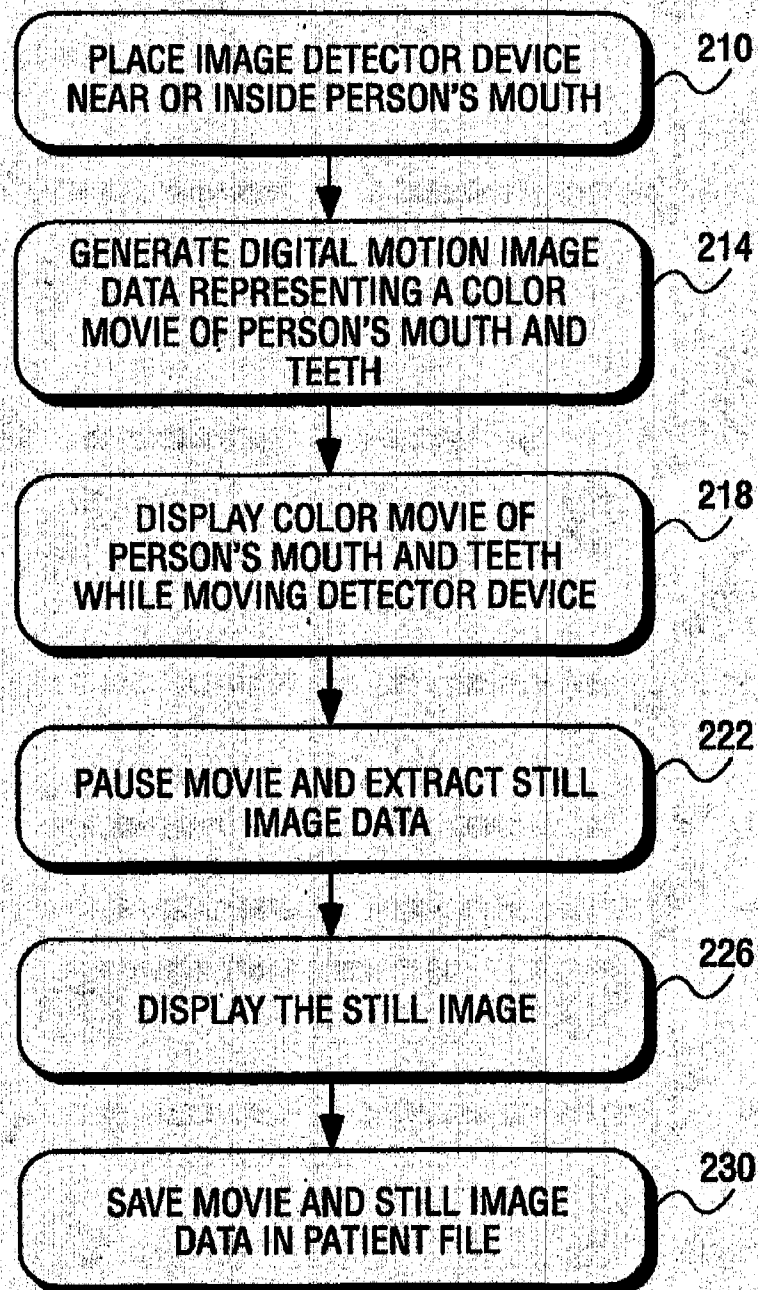


FIG. 1

**FIG. 2**

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DENTAL IMAGING SYSTEM WITH DIGITAL MOTION VIDEO

BACKGROUND

This invention is generally related to dental imaging systems and more particularly to systems that support digital motion video.

Dental imaging systems have been used for a number of years to assist the dentistry professional in recording images of a patient's mouth. Conventional systems include the analog video camera and video cassette recorder (VCR) combination and, more recently, digital still image capture systems. Both systems use a miniature camera known as an intraoral camera that is inserted into the patient's mouth to capture images of teeth and gums. At the same time, the images are being displayed which allows the dentist as well as perhaps the patient to view the treatment areas in a more comfortable manner.

With the analog VCR system, the dentist can create a movie of the patient's mouth. Although the movie is a useful feature both from a diagnosis standpoint and from a patient understanding point of view, dentists often only need to store a still image of the treatment areas for their patient records. The VCR system, however, is not an effective means for providing still images, primarily because of the well-known "shakes" that often appear on the display when the movie is paused. Moreover, a VCR-based system does not provide for easy indexing, access, and manipulation of the still images.

The digital still image capture system has solved some of the problems in the older VCR-based systems by providing digital still images that can be easily stored and manipulated using a personal computer (PC). However, shakes or flutter in the still image are still a problem, particularly because the smallest movement between the intraoral camera (which has a high magnification) and the patient's mouth can cause the scene to change dramatically while a single still image is being captured. The dentist may need to hold the camera very still for several retakes until an acceptable quality still image is captured. This is an undesirable burden. Moreover, although the system can create still images, the creation of movies will require a separate VCR-based system. This dual requirement is a financial and practical burden which has not helped promote dental imaging systems in the past.

In view of the above, there is a need for a novel dental imaging system that can reduce the incidence of shakes in digital still images and still provide a cost effective movie solution.

The use of digital still images has also allowed image manipulation techniques to be used in illustrating the visual effects of cosmetic treatments on a patient's mouth and teeth prior to the treatments actually being performed on the patient. With conventional techniques, the outline of the teeth are manually marked off on the image. However, because of the need to carefully delineate the teeth boundary (so as to obtain a more realistic representation of the treatment to be performed), the manual technique is often too time consuming, thus precluding its performance while the patient waits in the operatory. Therefore, there is also a need for a faster tooth detection technique.

SUMMARY

The invention is directed at computer-implemented methods of dental imaging. A computer system is used to record digital motion image data and display a corresponding digital movie of a patient's oral site. Data representing a still

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image of the site is selected from the motion image data. The motion image data is acquired at a rate that is sufficiently high so as to require maybe at most one frame advance or rewind in order to obtain a still image having the desired angle and being free of shakes.

Another embodiment of the invention is directed at using image processing techniques, including color filtering and edge detection, to automatically detect teeth in an image of a patient's mouth, without having to manually define the teeth.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a logical block diagram of a computer system for digital motion and still image capture according to a first embodiment of the invention.

FIG. 2 is a flow diagram of steps performed during digital motion and still image capture according to another embodiment of the invention.

FIG. 3 illustrates an embodiment of the invention as a software/hardware architecture for digital motion and still image capture.

FIG. 4 illustrates a flow diagram of steps performed by a computer system for automatic tooth detection according to another embodiment of the invention.

FIG. 5 illustrates a screen shot of a display showing still images in multiple windows according to another embodiment of the invention.

FIG. 6 illustrates a screen shot showing the results of the tooth detection methodology according to another embodiment of the invention.

DETAILED DESCRIPTION

As summarized above, some of the embodiments of the invention are directed at a computer-implemented method of dental imaging that provides digital motion images, and shake-free still images of a patient's mouth that are extracted from the motion images. Using digital motion images to derive the still images allows the user to easily vary and select the angle of the still images while a movie of the patient's mouth is being recorded. The patient can also be given a movie tour of her mouth and teeth by rotating and moving the camera around the mouth and teeth to achieve a pleasant 3-D effect. Once the movie and still images have been acquired, they can be stored with associated patient identification and other information in a database for easy access at a later time.

In another embodiment, the invention provides steps to be performed by a computer system in automatically detecting the teeth and gums of the patient based on a still image of the patient's mouth.

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For purposes of explanation, specific embodiments are set forth below to provide a thorough understanding of the invention. However, as understood by one skilled in the art, from reading this disclosure, the invention may be practiced without such details. Furthermore, well-known elements, devices, process steps, and the like, are not set forth in detail in order to avoid obscuring the invention.

Turning now to the figures, FIG. 1 is a logical block diagram of a computer-based system 100 for digital motion

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and still image capture according to a first embodiment of the invention. In describing the system, the description below will also refer to the process steps in FIG. 2. The system 100 is built around a bus 150 and includes a processor 118 used for selecting still image data 152 from digital motion image data 144 that represent a movie of a patient's oral site. In one embodiment, the motion data are generated by a motion image capture block 114 in response to receiving signals from an image detecting device 110. The detecting device 110 may be a handheld device which includes an optical system and image sensor electronics that are configured to capture sufficiently detailed images of a person's oral site, including teeth and gums, for purposes of dental diagnosis. In one embodiment, the device is an intraoral camera which is partially inserted into a patient's mouth and aimed at the desired areas of the patient's oral site.

As the detecting device 110 is moved around the patient's mouth in step 210, motion data is being generated in step 214. The system displays the motion data as a movie to the user, and perhaps the patient, using a display 138, as part of step 218. A wide range of devices can be used as part of the display, including the conventional cathode ray tube (CRT), which have the proper spatial resolution and color capability for displaying detailed images of the mouth and teeth.

When an image of the desired area appears on the display 138, the user, in particular a dentist, selects data from the motion image data that represents a still image of the desired area. This may be done by first pausing the movie, and then selecting the paused image to be the still image, as performed in step 222. Motion data will normally continue to be recorded while the movie is paused, but need not be such as when the movie has already been previously recorded and is being played back. The movie may be paused in response to direct user input. The user input can be transmitted via a user I/O device 131 such as a foot pedal switch, a pointing device such as a mouse, or even a microphone if the computer system is configured to recognize voice commands. As an alternative to direct user input, the movie may be paused or a still image selected in response to a pre-defined triggering event. For instance, the processor can be programmed to pause the movie in response to detecting a particular pattern in the motion data. Thus, a wide range of mechanisms can be used to trigger pausing the movie.

Once the movie is paused, the user determines whether the paused image is of acceptable quality, i.e., sufficiently free of shakes or flutter. If the movie were playing in a small window, then the paused image can be enlarged and placed in a separate, larger window. Alternatively, if the computer system can support the needed frame rate while the movie is playing in a large window or even at the full resolution of the display, then the paused image need not be dragged or enlarged into a separate window. In either case, a still image of the desired area is displayed, as part of step 226.

Because of the rapid rate at which the motion data is acquired, the paused image is most likely free of flutter. In the event there is a noticeable shake or flutter, the user may quickly advance or rewind a few frames to obtain an alternate image that is free of shakes without repositioning the detecting device and re-recording a still image. The alternate image will most likely cover the desired area of the oral site, due to the high rate used in acquiring the motion data. Indeed, experimental results have shown, in one embodiment of the invention, a high likelihood of the first paused image having minimal or no perceptible shakes. The motion data in that case were obtained at a rate of approximately 12 frames/second. Higher frame rates may be

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possible, depending on the processing and storage capability of the processor 118 and motion image capture mechanism 114, which may further reduce the likelihood of the paused image being affected with shakes.

Once the desired tour of the patient's mouth has been recorded as a movie along with the derived still images, the recorded data associated with patient identification, and perhaps with other patient or treatment information, may be stored as part of a patient file as step 230. The determination of patient identification and other information for the patient file may be made prior, during, or after the motion and still data has been acquired. The patient file is a collection of one or more electronic files that contain movies and/or still images of a dental patient, such as a human being or animal, acquired by the system 100. The patient file can be stored as part of a database 140 which may include the patient files of a dental service provider or research institution. The database can be part of a computer network (not shown) in a dentist's office, so that in the embodiment of FIG. 1, the link between the database and the processor is a local area network (LAN) link. In addition, the database can be part of a larger intranet, enterprise network, wide area network, or even the Internet for access by an even greater number of users.

In addition to being stored in a database, the acquired motion and still data can also be transmitted in real-time to remote locations using an optional communication interface 132. For example, the interface may include a standard analog modem used to engage in videoconferencing with other dentists or specialists at remote locations over the telephone lines.

The embodiments of the invention described above may be implemented using a general purpose personal computer ("PC") of the Windows™/Intel™ ("Wintel") or of the Apple Macintosh™ variety. Of course, more specialized machines such as image processing-type workstations can also be used. The Wintel PC can feature an Intel Pentium processor running a Microsoft Windows graphical user interface. The system hardware can be centered around a Peripheral Components Interconnect (PCI) bus to which the processor, program memory 124 (which normally comprises mostly of semiconductor random access memory (RAM)), display, mass storage device 136 such as a magnetic and/or optical disk drive, and a motion image capture device 114 such as a digital video capture card or board are coupled. The video capture card can be one which supports Microsoft's Video for Windows suite of imaging and graphics protocols. The video capture card is coupled to the image detecting device being, for instance, an intraoral camera, via an analog signal interface 112 such as one that supports the industry standard S Video output. The video capture card will have the proper hardware (including logic circuitry and/or a programmed processor) to interface with the intraoral camera and to implement the function of an image frame grabber as known to those skilled in the art. The intraoral camera has an optical system and image sensor technology that are suitable for obtaining acceptable quality images of a patient's mouth and teeth for dental diagnosis purposes, as known to those skilled in the art.

The needed software for orchestrating image capture, display, and storage can be written using different programming languages and tools, such as the C language and the Microsoft Windows Application Programming Interface. An embodiment of the software architecture is illustrated in FIG. 3.

FIG. 3 illustrates a software and hardware architecture for an embodiment of the invention as a dental imaging system

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featuring motion and still image capture. The architecture includes three main software blocks entitled application program 310, user interface 318 and imaging driver 314. These components operate together to perform the necessary computer implemented steps of the flow diagrams in FIGS. 2 and 4.

The application program 310 may be configured as a stand-alone piece of software that can communicate with the different hardware components illustrated in order to orchestrate the functions of a dental imaging system, including image capture, display, and storage. In particular, image capture is performed with the aid of an imaging driver 314. The imaging driver 314 is a device driver, i.e., a piece of software used to control a hardware component or computer peripheral device, in this case the video capture card or board 316. The driver 314 forwards motion image data from the video capture board to the application program. In one embodiment, the imaging driver 314 may be a Video For Windows (VFW) driver provided by Microsoft Corporation and which is designed to interface a video capture card 316 supplied by a particular manufacturer. The VFW driver and corresponding video capture board support the VFW suite of protocols.

In addition to communicating with the imaging driver, the application program also communicates with a user interface 318. The user interface 318 obtains user commands in terms of foot pedal movement, cursor movement, and mouse select button/keyboard information from various I/O devices 131 such as a foot pedal actuator; mouse, track ball, keyboard, touch sensitive screen or other display pointing mechanism; and even a microphone for voice commands. The user commands include start movie, stop movie, and select and drag still image frame as well as any other display and program control commands which are used by the application to control the operation of the dental imaging system.

The application program 310 can be modeled based on an image capture test program known as CAPTEST which is often shipped with VFW to test the performance of the video capture card. The application program should be written to communicate with the imaging driver 314, mass storage 136, and display 138 to retrieve, save, and display the motion image data representing a patient exam movie. In addition, the application program should also include the ability to pause the movie while the motion image data is being recorded and extract a still image frame for the paused image. The results can be seen in an exemplary screen shot of a display illustrated in FIG. 5 in which a centrally located movie window 510 displays a paused image of a patient's tooth. In that embodiment, the movie can be paused using a control panel at the top of the window 510, and/or using a footpedal switch (not shown).

After the movie is paused, the user may select the movie window 510 containing the paused image 512 and drag the paused image towards a corner of the display. The application program 310 is configured to automatically expand or scale the paused image into a larger window that covers approximately one fourth of the full display. The user may next advance or rewind the movie, on a per frame basis if desired, using the control panel in the movie window 510 to display images of other treatment areas or alternate shake-free still images of the same area. These additional still images can also be selected and dragged to the remaining corners of the display as shown in FIG. 5. In this way, the user can effectively display multiple still images, based on the original patient exam movie, that show different areas of treatment in the patient's mouth in a shake-free manner.

The application program 310 also supports interfaces to the hardware communication interface 132 to perform, for

6

instance, videoconferencing. In addition to being shared with others at remote sites, the images obtained by the application program can be stored in a database 140. In particular, the interface to the database 140 may be implemented based on Microsoft Access™ or other commercially available database programs that can support the storage and access of patient files that include the still image data as JPEG files and perhaps even the motion image data as MPEG and AVI movie files.

Although a particular embodiment using currently mature technologies has been described in reference to FIG. 1, it should be noted that other technologies can also be used which still retain the spirit of the invention. For instance, future sensor technologies may be developed which allow the image detecting device 110 to transfer digital signals, including perhaps the actual motion image data, directly to the system's processor 118, using, for instance a high performance computer peripheral bus interface (not shown) that operates according to standards such as Universal Serial Bus (USB) or IEEE 1394-1995. In that scenario, the digital functions of the motion image capture block 114 could be subsumed by either the processor 118 or the detecting device 110.

Another embodiment of the invention can be defined as computer-readable media. The medium can be, for instance, an optical disk such as a CD-ROM that contains different software components which represent and include instructions to be executed by the system and in particular the processor 118 of FIG. 1. The instructions cause the processor 118 to configure the system 100 to perform the steps described above in FIG. 2 or below in FIG. 4 to obtain still images derived from a digital movie. The medium can alternatively include an integrated circuit that is part of the program memory 124 (see FIG. 1) loaded with the instructions that configure the processor to perform the steps of FIG. 2 or FIG. 4 or with the software described in FIG. 3. A wide range of media storing the instructions are contemplated, including a distributed medium in which parts of the instructions appear in separate machines that are linked together through a network. The instructions stored in the media can, in addition to image capture, cause the system to perform a variety of image editing and transmitting (e.g., videoconferencing) functions as well.

Another embodiment of the invention is directed at using image processing techniques including color and edge detection to automatically detect regions having teeth in an image of a patient's mouth, without having to manually define the regions. The steps as illustrated in FIG. 4 begin with step 410 obtaining a still color image of the patient smiling or with her mouth open so that her teeth are visible. The still image can be obtained using, for instance, the techniques described above in connection with FIG. 2.

Once the still image showing the teeth has been captured, the user may select an area of the image that contains one or more teeth by, for instance, drawing a rectangle around the patient's teeth. This defines a detection area in the bitmap image. Operation then continues with step 412 where the system is configured to scan the image data, including pixel values, in the selected area looking for predefined color and hue patterns and edge conditions that define teeth. An exemplary methodology for tooth detection described using pseudo-code is shown below together with an exemplary C language source code listing in Appendix A. A screen shot of the results that may be obtained is illustrated in FIG. 6 where image 610 is the original still image and image 618 includes the detected teeth regions being highlighted.



US005927973A

United States Patent [19]

Hanebaum et al.

[11] Patent Number: 5,927,973

[45] Date of Patent: Jul. 27, 1999

[54] APPARATUS AND METHOD FOR MEASURING THE POSITION OF THE OCCLUSAL PLANE OF THE MOUTH

[76] Inventors: Allen Hanebaum, 10105 Donegal Ct.;
Herbert L. Robinson, 10104 Newhall Rd., both of Potomac, Md. 20854

[21] Appl. No.: 08/988,213

[22] Filed: Dec. 10, 1997

[51] Int. Cl.⁶ A61C 19/04

[52] U.S. Cl. 433/72; 600/590; 33/513

[58] Field of Search 433/72, 73; 600/590; 33/513, 514

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Primary Examiner—Ralph A. Lewis
Attorney, Agent, or Firm—Hoffman, Wasson & Gitler

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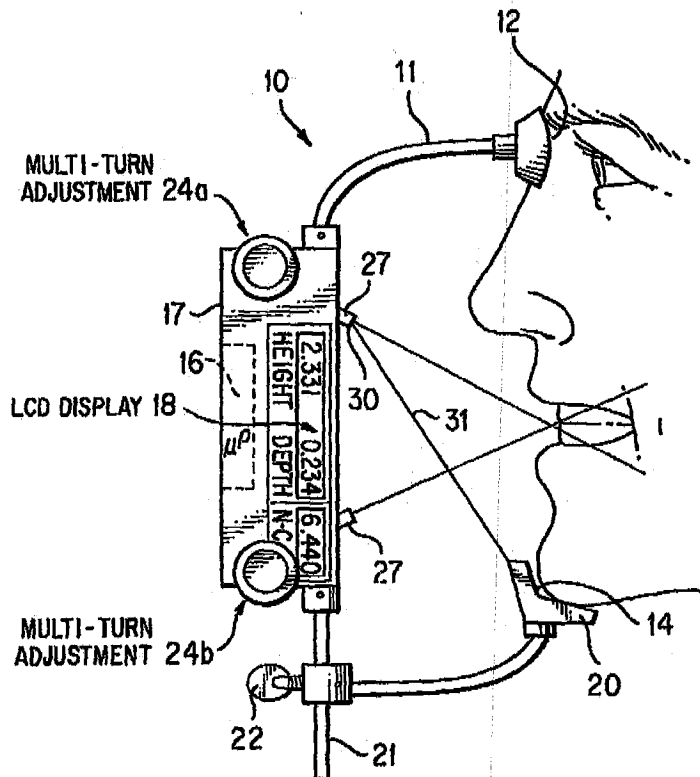
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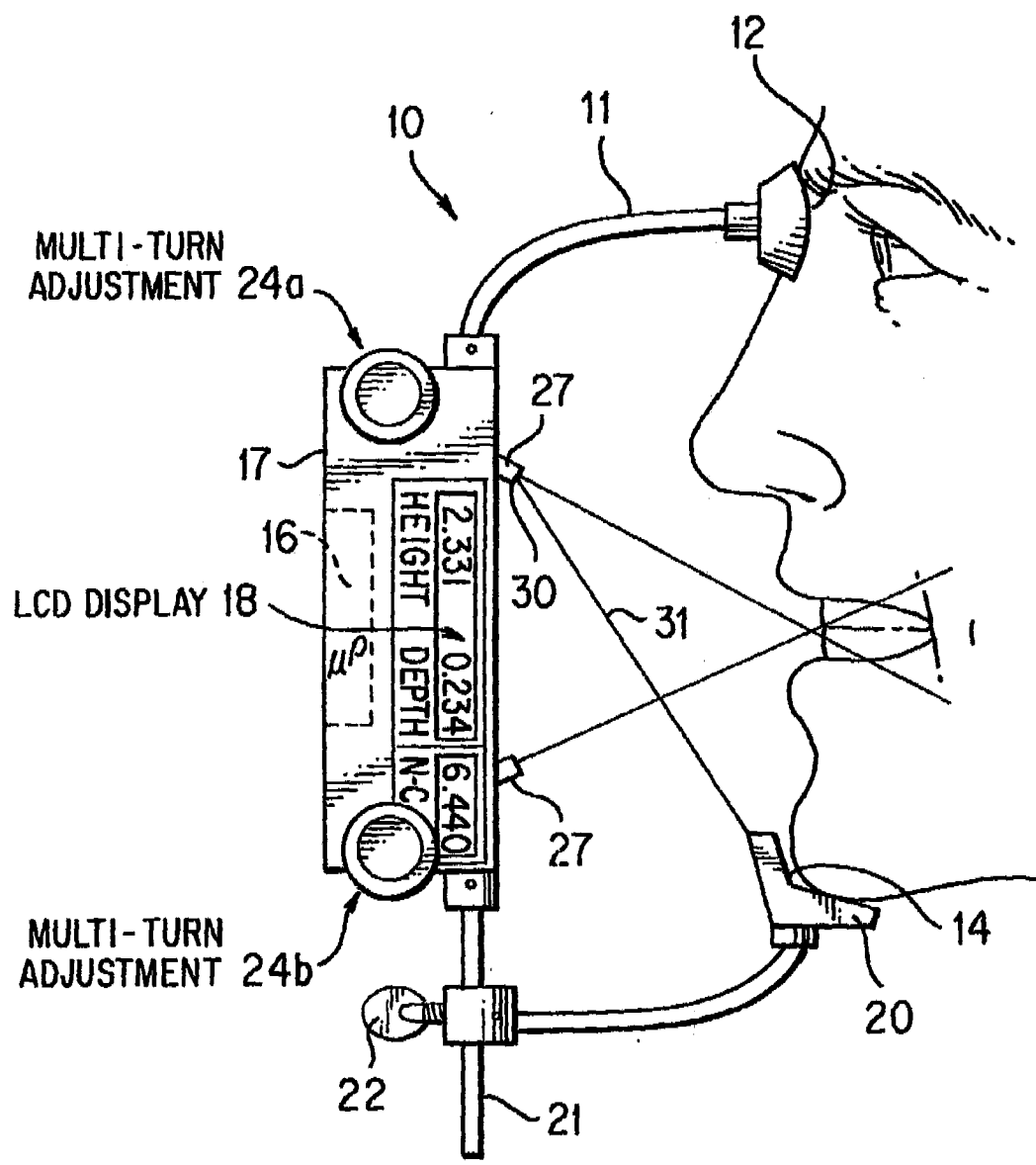
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[57] ABSTRACT

An instrument and method to measure the position of the occlusal plane of the mouth with reference to the structural features of the cranium. The instrument includes a vertical face bow, positioned on the nasal bridge and the forward edge of the base of the chin. The device employs light beams to make measurements of the patient's occlusal plane and the nose-to-chin distances. The device utilizes an internal processor to make the necessary calculations, provides direct numerical readouts, is battery powered and self-calibrating. The entire device is sealed to permit cold sterilization by liquids.

19 Claims, 5 Drawing Sheets





APPARATUS AND METHOD FOR MEASURING THE POSITION OF THE OCCLUSAL PLANE OF THE MOUTH

FIELD OF THE INVENTION

The present invention pertains to an instrument and method to measure the position of the occlusal plane of the mouth with reference to the structural features, i.e., the bones, of the cranium. More particularly, the occlusal plane is the "bite plane," the surface where the upper and lower sets of teeth meet. The determination of its location is essential in the creation of satisfactory dental prostheses such as upper and lower dentures or major bridges.

The device of the present invention measures the position of the front edge of the occlusal plane with respect to both the nasal bridge and the base of the chin of the patient.

BACKGROUND OF THE INVENTION

The need for reconstructive surgery of teeth by means of full or partial upper and/or lower dentures is common, particularly among older people and those who have suffered an injury.

The reconstructive process typically begins by the dentist taking impression molds of the patient's remaining teeth and gums. These impressions are made by having the patient bite into soft impression material held in a U-shaped tray that fits around the teeth and gums. These negative molds, when hardened, are then used to make models by casting, in wax and/or plaster or similar plastic materials, of the tooth and gum structure. These positive models are then mounted in a device called an articulator, by a technician who then makes preliminary adjustments for bite interface, fit and appearance. The technician sends the models to the dentist, who proceeds to make further adjustments while fitting the models to the patient. The adjusted models are then used as the basis for the final prosthesis.

A major drawback in the foregoing procedure is relating the initial models, taken by the dentist, to positions of the models in the articulator, so the technician can adjust the models for the correct mouth fit. It should be noted that even if the prosthesis fits well over the gums, improper mouth fit, caused by either improper tooth position or an incorrect relationship between the upper and lower teeth is a major source of patient discomfort. Rework is costly, time consuming and often produces even more patient complaints.

Proper, accurate measurement of the occlusal plane will greatly reduce the foregoing problems. It will also simplify the process of checking fit during the intermediate stages when working with the preliminary molds in the patient's mouth, prior to creating the final prosthesis.

Three methods have been most frequently used to reduce the problems mentioned above. The first is by the use of instruments called "face bows." A second method is by the use of instruments that trace the "gothic arch" of lower jaw motion. The third method has been to use no instruments at all, but rather for a dentist to "eyeball" the measurements and trust to luck and a skilled technician at the articulator.

A face bow, as the name implies, is a bow-shaped metallic device whose ends are referenced to some feature of the human skull. Nearly all face bows are oriented horizontally and the ends are referenced to the ear holes. For example, U.S. Pat. Nos. 3,084,438 and 3,200,497 (Goodfriend) relate to horizontal bows which rest in the ears, using plugs, and on the bridge of the nose. U.S. Pat. No. 1,188,416 (Dalbey) pertains to a device for measuring the occlusal plane. The

device is a horizontal face bow, connected to the ear holes and resting on the bridge of the nose and under the nose.

A few face bows are referenced to the temporal-mandibular-joint (TMJ), but such referencing is very difficult, and therefore such face bows are rarely employed. For example, U.S. Pat. No. 4,411,622 (Hansen) discloses a device for locating the jaw hinge (TMJ) rather than using the ear holes for a bow reference. Typically, the ends of the horizontal bow have tapered plugs which are inserted into the ears. A third reference point is needed to establish a reference plane to measure from, and the bridge of the nose is often used as such a reference point. Occasionally the third reference point is the forehead or just a level indicator. See for example, U.S. Pat. No. 5,176,515 (Andrews) which illustrates a dental treatment method and apparatus.

The flaw in the foregoing method is that the human face is not symmetrical and ear holes are "soft" mountings with respect to the bone structure. As a result, the bow will usually be tilted and off center. Furthermore, when reset for a later measurement, the new setting will most likely not be in the same plane due to the soft mounting. To summarize, the measurements are not closely repeatable and are not very accurate.

Since the foregoing bows are all entirely mechanical in adjustment and in setting, they are awkward, slow, and often hard to read as the fiducial markings must be poorly placed. The measurements are made by attaching a probe to the bow and then moving it in height and inward toward the teeth. The probe must just touch the edge of the teeth (or tooth) or the gums where there are no existing teeth. Such positioning requires some delicacy and skill and the patient must remain as motionless as possible for a significant period of time. In addition, horizontal face bows make no measurements with reference to the lower jaw, which leaves out important data for the articulator technician.

Vertical face bows are rare, and the present inventors are only aware of one patent to Sorenson, U.S. Pat. No. 1,976,045. Such a vertical face bow eliminates some of the drawbacks inherent in the use of horizontal bows. In particular, the vertical face bow is centered, it rests against firm cranial features, namely the nasal bridge and chin, and has a lower jaw reference. A vertical face bow is also potentially more repeatable. However, a vertical face bow requires more skill on the part of the dentist to take advantage of its design.

Some instruments establish the bite plane by means of tracing the movement of the teeth horizontally. An example is U.S. Pat. No. 2,656,603 to Brassie which relates to an instrument for relating casts to dental articulators and traces the horizontal movements of the lower jaw to measure aspects of the occlusal plane. A frame is fastened to the head and a flat plate is attached and inserted into the mouth. The lower jaw is moved in a horizontal fashion. The teeth trace out a pattern resembling a gothic arch on a sheet of paper attached to the plate. While this pattern establishes the entire bite plane, rather than just the front edge, the method suffers from all the drawbacks of a horizontal face bow plus it is more awkward to use and to reference. It is seldom used except for the different function of bite or jaw analysis.

Oddly enough, many dentists take no occlusal plane measurements at all. They rely on the skills of the technician working with the articulator, plus their own skills during multiple fittings. Usually, they arrive at a good result; despite the fact that this takes considerable time of both the dentist, his or her staff, the technician, and not least the patient. Of course, this drives up the cost and exposes all to

the risk of error. Major errors, and consequent rework, may necessitate scrapping the initial prosthesis and starting again.

The reason that this method is so often used is that the other methods work so poorly, for the reasons stated previously. The truth is that no measurements, or rather the visual techniques of the dentist and technicians are rarely worse than using the available instruments.

The instruments can produce useful data in the hands of a highly skilled dentist, but this is just the person who can estimate values well without instruments.

What is required is an instrument that is easy to use, quick, accurate, and can take repeatable measurements that are of value to both dentist and technician. The proposed invention is such an instrument.

SUMMARY OF THE INVENTION

The present invention is designed to overcome the drawbacks of previous methods and offers additional advantages.

An object of the present invention is to permit easy operation with rapid taking of measurements to reduce patient inconvenience.

Another object of the present invention is to provide an instrument which produces repeatable measurements; i.e., produces the same values each time a measurement of the same object is taken.

Yet another object of the present invention is to improve the accuracy of the measurements above that of present methods.

Still another object of the present invention is to provide an instrument which takes measurements that permit referencing to both the upper and lower jaw.

Another object of the present invention is to provide an instrument which takes measurements while avoiding contact with the patient's mouth, teeth, or gums. This reduces patient discomfort and permits easy sterilization.

Yet another object of the present invention is to provide an instrument which can be produced at low cost.

To achieve the foregoing and other objects, the present invention is directed to a vertical face bow, positioned on the nasal bridge and the forward edge of the base of the chin. The device employs light beams to make measurements of the patient's occlusal plane and the nose-to-chin distances. The device utilizes an internal processor to make the necessary calculations, provides direct numerical readouts, is battery powered and self-calibrating. The entire device is sealed to permit cold sterilization by liquids.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other objects and attributes of the present invention will be described with respect to the following drawings in which:

FIG. 1 is a side view of a first embodiment of the present invention;

FIG. 2 is a side view of a second embodiment of the present invention;

FIG. 3 is a side view of the second embodiment shown in FIG. 2 having a third light source;

FIG. 4 is a side view of the second embodiment of FIG. 2 of the present invention having a handle and a transparent shield; and

FIG. 5 is a side view of the first embodiment, shown in FIG. 1, having a mechanical drive for raising and lowering the chin rest.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention is directed to a dental occlusal instrument 10 in the form of a vertical face bow 11. It is hand-held by the dentist and measurements from it are referenced to the bridge 12 of the nose and the front of the base of the chin 14 of the patient.

A major point of novelty in the present invention is that the measurements are taken using light beams, so that there is no contact made with the patient's mouth. The process of taking the measurements is rapid, clean and accurate.

The measurements are calculated, using basic trigonometry, by an internal microprocessor 16 contained in a housing 17. The calculating is performed automatically, and the results are displayed on a display or numerical indicator 18. The apparatus is simple to operate requiring no specialized skill and the dentist needs to make only two adjustments.

In practice, prior to use, the dentist moves the chin rest 20 along a support pole 21, which extends up to said housing 17, to its highest or maximum vertical position, as shown in FIG. 2, and tightens the locking screw 22. The dentist then rotates the two multi-turn adjustment knobs 24a and 24b so that the light beams 26 intersect at the front edge 20a of the chin rest 20 as shown in FIG. 2. The display 18 will then read the predetermined values for such a setting, thereby calibrating the instrument 10, which is another novel feature of the present invention. If the readout is incorrect, indicating that the apparatus 10 is out of calibration, the values can be reset. The instrument 10 is now ready for use.

The dentist now slides the chin rest 20 downward. The patient is directed to approach the apparatus while keeping his or her jaws closed, and to draw back his or her lips from his or her teeth.

The upper rest 28 is then set upon the patient's nasal bridge 12 by the dentist, along the center line of his or her face. The chin rest 20 is then moved under the patient's chin, at the forward edge, so that the chin 14 rests in the notch 20b of the chin rest 20 as shown in FIG. 1, and the rest is locked in place by the locking screw 22.

The dentist next rotates the multi-turn adjustment knobs 24a and 24b to aim the light beams 26, from light source 27, so that they intersect on the feature to be measured (tooth edge or gum for example). The light beams 26 are shown as lines 1 in FIG. 1.

The instrument 10 then automatically calculates the height and depth of the point to be measured, referenced to the bow 11, and the nasal bridge 12.

To measure the bridge-to-chin distance, the dentist adjusts the upper beam 26a, by means of the adjacent knob 24a, to aim at the edge of the chin rest 20, shown by line 2 in FIG. 1. Since the mechanical design fixes the depth, only one beam is needed to measure the position of the chin rest 20. This measurement can be taken with the bow 11 removed from the patient's face.

In the embodiment shown in FIG. 3, a third light source 32 is provided near the lower light source, and produces a light beam 33 to measure the position of the chin rest 20. The third light source 32 is adjusted by multiturn adjustment knob 34.

The light sources 27 and/or 32 can be of different colors to differentiate the beams for ease of adjustment.

The device 10 will display three measurements, height, depth, and chin rest position, on the display 18 as numbers in tenths of millimeters. Prior art strives to achieve accuracy



US005882192A

United States Patent [19]
Bergersen

[11] **Patent Number:** 5,882,192
[45] **Date of Patent:** Mar. 16, 1999

[54] **COMPUTERIZED ORTHODONTIC DIAGNOSIS AND APPLIANCE DISPENSER**

[75] **Inventor:** Earl O Bergersen, Winnetka, Ill.

[73] **Assignee:** Ortho-Tain, Inc., Bayamon, Puerto Rico

[21] **Appl. No.:** 961,092

[22] **Filed:** Oct. 30, 1997

[51] **Int. Cl.⁶** A61C 3/00

[52] **U.S. Cl.** 433/2; 433/6; 433/214

[58] **Field of Search** 433/2, 6, 3, 24, 433/68, 214, 223

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Primary Examiner—Ralph A. Lewis

Attorney, Agent, or Firm—Hill & Simpson

[57] **ABSTRACT**

A method and apparatus for diagnosing orthodontic conditions of an individual. The apparatus includes an outer case and a user interface disposed on the outer case for communicating with the individual. The apparatus further has diagnostic hardware including at least one digital camera carried within the case adapted to take a plurality of video images of the teeth and mouth of the individual. The apparatus further has electronic circuitry which is preprogrammed with statistical data for comparison to actual data collected by the diagnostic hardware and transmitted to the electronic circuitry. The circuitry is further adapted to diagnose whether the individual has correctable orthodontic conditions. The apparatus is further adapted to dispense instructions to the individual for receiving proper corrective orthodontic care. The method of the invention includes providing an apparatus adapted to take various digital images of the individual's teeth and mouth. The digital images are analyzed by the electronic circuitry and compared to the statistical data preprogrammed within the apparatus for diagnosing whether the individual has correctable orthodontic conditions. The method further includes the steps of informing the individual as to whether their orthodontic conditions are correctable and instructing the individual on how to correct the orthodontic conditions diagnosed and dispensing an appropriate appliance.

27 Claims, 20 Drawing Sheets

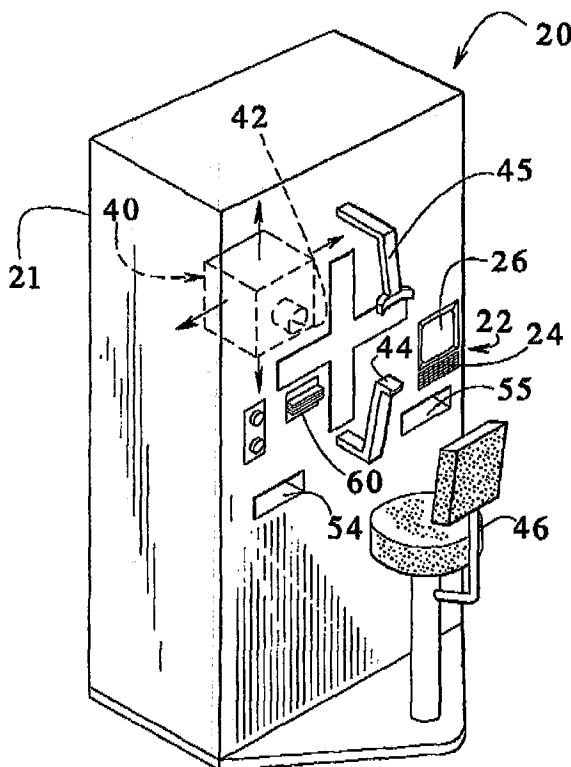
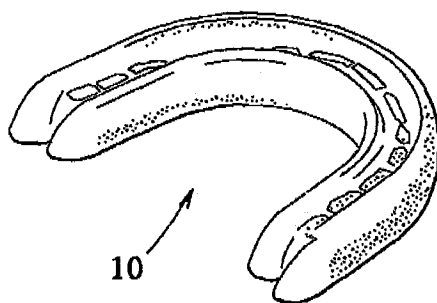


FIG. 2

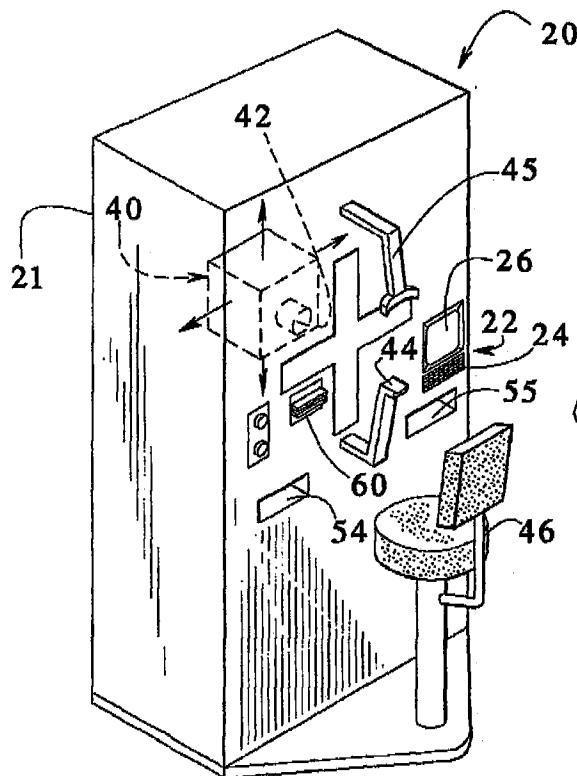


FIG. 1

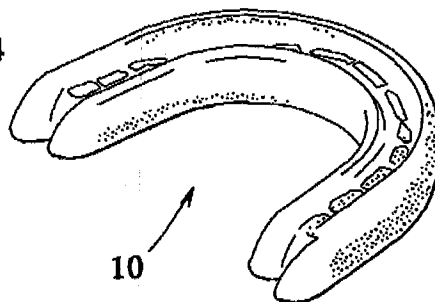
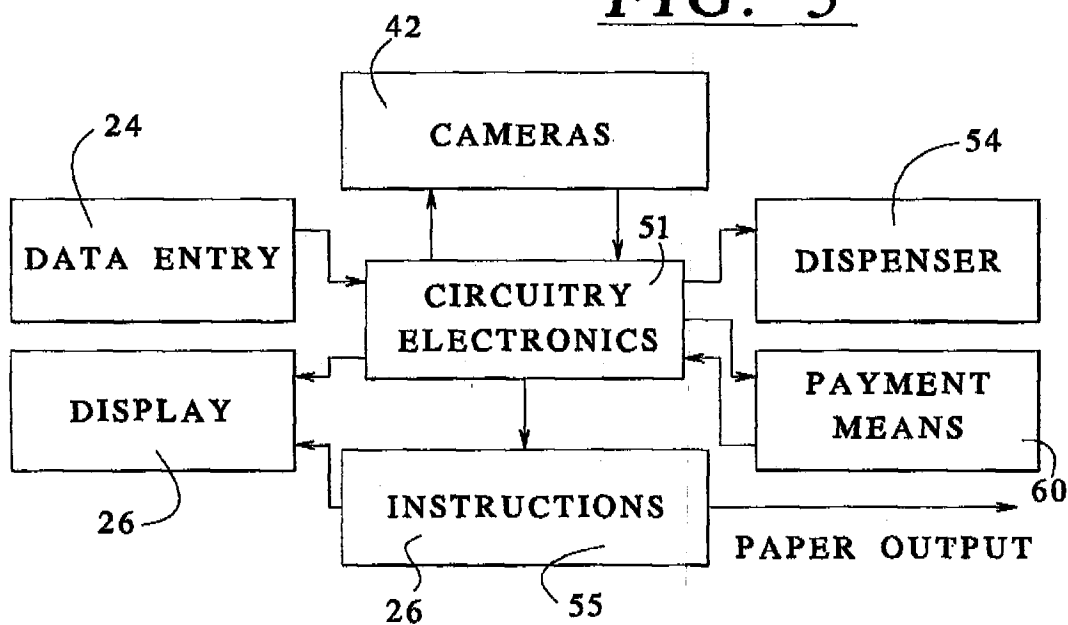


FIG. 3



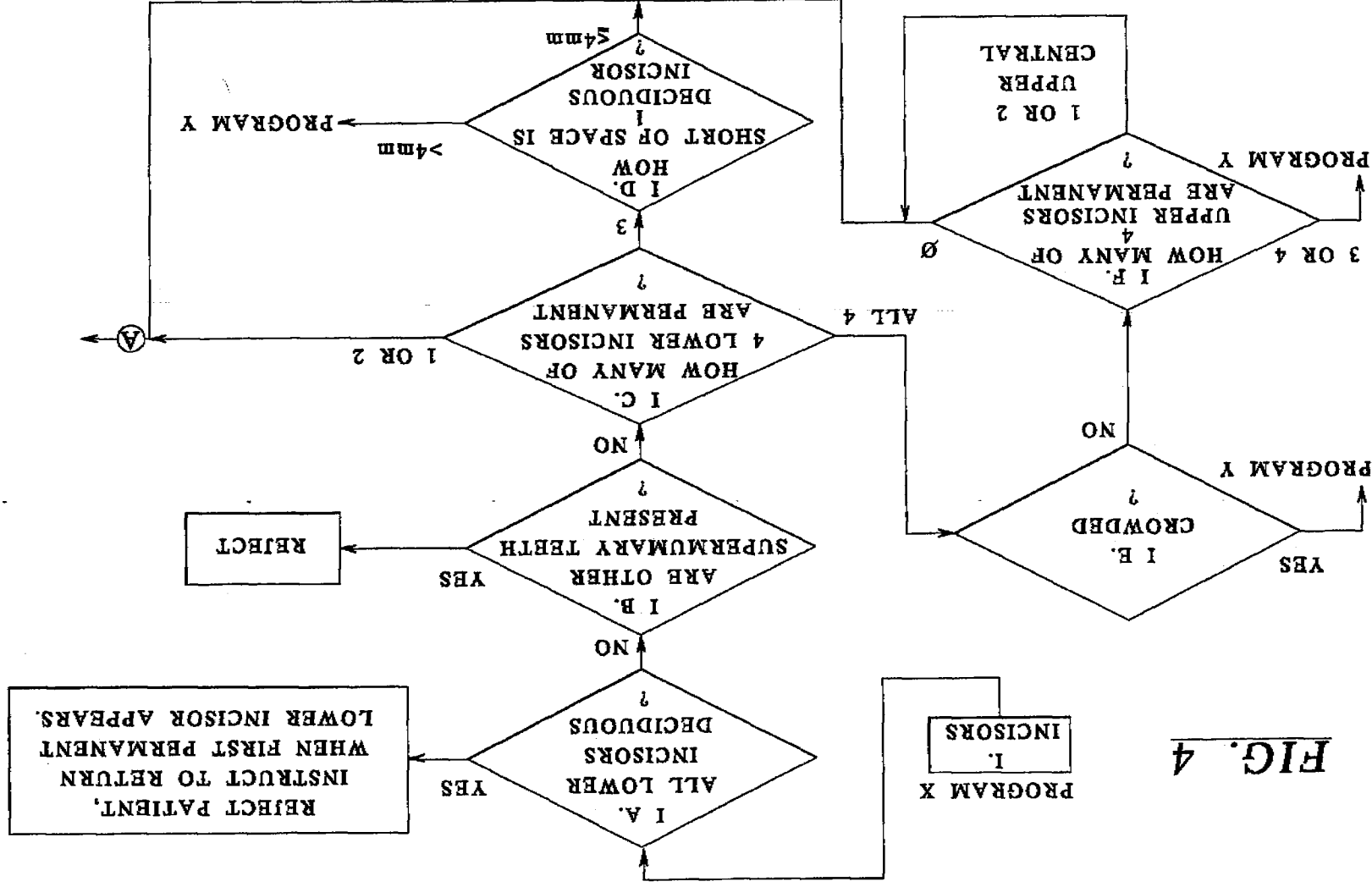


FIG. 4

174
135

**SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
DIVISIÓN DE NUEVAS CREACIONES**

2020
Bogotá, D.C.,

Abogado (a)
/ **ANNIE ROSAS MARKEN**

ASUNTO

Radicación 01-84148
Trámite 002
Evento 001
Actuación 430
Oficio 9836
Folios 019

Patente de Invención



Patente de Modelo de Utilidad



Vía Nacional



Vía PCT (fase nacional)



Cap. I



Cap. II



Como resultado del examen de fondo, realizado con fundamento en el artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le comunica:

1. Documentos estudiados

Descripción:

Folios: 17 a 41 como se radicó inicialmente

Reivindicaciones:

Folios: 42 a 50 como se radicó inicialmente

Folios: 135 a 146 del pliego modificado

Folios: 159 a 160 pliego modificado

Dibujos:

Folios: 73 a 55 como se radicó inicialmente

Folio: 158 figuras 1 y 2.

Rta. Del Solicitante:

Folios: 155 a 160

Prioridad:

Folio: 1

(11 oct. 2000, US, N°. 09/686.142).

2. Objeto de la invención

La presente solicitud se titula "UN APARATO PARA PROPORCIONAR UNA EVALUACIÓN DEL ESTADO ORTODÓNTICO DE UN USUARIO Y SISTEMA QUE LO UTILIZA", Folio N° 90.

El objeto de la presente solicitud se refiere a un sistema y un método que permite la revisión bucal de uno o más usuarios que reciban posteriormente una evaluación de sus condiciones médicas.

126
175

De otra parte, el nuevo pliego reivindicatorio reclama: un aparato para proveer un diagnóstico del estado ortodóntico de un usuario y dispensar uno de una pluralidad de dispositivos dentales de diferentes tamaños, relacionado en las reivindicaciones 1 a 9

El objeto de la solicitud definido anteriormente se clasificó en la IPC A61C 19/04.

3. De la solicitud de Patente

3.1. Descripción (artículo 28 D-486)

La oficina reitera que la información presentada en el capítulo descriptivo NO indica la forma de ejecutar la invención. La divulgación de la invención NO se realizó de manera clara, concisa y completa, ya que el capítulo descriptivo no contiene las indicaciones de:

- i) Como se disponen o acoplan los componentes del aparato para proveer un diagnóstico,
- ii) Una nueva función entre los componentes del aparato.

La descripción calificada se limitó a presentar la programación de la unidad central de procesamiento y como con los resultados del programa se evalúa el estado ortodóntico del usuario. Estas indicaciones NO son suficientes para que una persona versada en el arte pueda ejecutar la invención, ya que lo que se necesita son las indicaciones precisas para ejecutar (fabricar, construir) el objeto reclamado. Por las razones anteriores no es posible determinar con claridad cual es la mejora aportada por el solicitante al estado del arte.

Por los motivos anteriores, la solicitud presentada NO cumple con los requisitos exigidos en el artículo 28 D 486.

3.2. Reivindicaciones (artículo 30 D 486)

El nuevo capítulo reivindicatorio presentado por el solicitante, no solventa las objeciones realizadas en el Oficio No. 16050, por cuanto las nuevas reivindicaciones no definen la materia que se desea proteger.

La reivindicación 1 se refiere a un aparato para proveer un diagnóstico que comprende: un dispositivo de captura de imágenes, un mecanismo de enfoque conectado al dispositivo de captura y una unidad de procesamiento central. De lo anterior se concluye lo siguiente:

- La reivindicación no presenta de forma clara cual es la materia característica de la invención, e decir el aporte del solicitante al estado del arte.
- La reivindicación no define la materia reclamada ya que se limita a enumerar los componentes del aparato sin establecer ninguna relación estructural o funcional existente entre estos. Tan solo se menciona someramente que el dispositivo de captura y el mecanismo de enfoque están conectados, pero no se establece que tipo de conexión es, cuales pines o que terminales se utilizan, que circuitos están involucrados, etc.

Las reivindicaciones dependiente 2 a 9 no aclaran ni delimitan ninguna característica técnica de la invención, porque se refiere a elementos sin ningún enlace estructural con los elementos de la reivindicación 1. Las reivindicaciones 2, 3 y 6 se refieren a dispositivos adicionales conectados a la unidad de procesamiento, pero no se

especifica ni como están formados estos dispositivos ni como es la conexión con la unidad de procesamiento.

Las reivindicaciones 4, 8 y 9 se refieren a elementos adicionales del aparato que no están relacionados de ninguna forma con el objeto de la solicitud, tan solo se nombra que existen, pero no se menciona en que lugar se ubican como se conectan, etc.

Por los motivos anteriores, el pliego reivindicatorio no cumple con los requisitos de claridad y concisión de acuerdo al Art. 30 de la Decisión 486.

4. Determinación del Estado de la Técnica

Considerando que la solicitud de patente reclama prioridad del 11 de octubre del 2000, se buscaron documentos del estado de la técnica relacionados, con fecha de publicación anterior a esta. Se realizó búsqueda de documentos relevantes dentro del estado de la técnica, entendiendo como estado de la técnica la definición provista en el Art. 16 D 486, y las excepciones fijadas en el Art. 17 de la misma.

Se encontró como anterioridades los documentos relacionados a continuación afectan la patentabilidad del objeto de la presente solicitud

Nº	Documento*	Título	Fecha de publicación
D1	US6093019	DENTAL IMAGING SYSTEM WITH DIGITAL MOTION VIDEO	2000-07-25
D2	US5927973	APPARATUS AND METHOD FOR MEASURING THE POSITION OF THE OCCLUSAL PLANE OF THE MOUTH	1999-07-27
D3	US5882192	COMPUTERIZED ORTHODONTIC DIAGNOSIS AND APPLIANCE DISPENSER	1999-03-16

*Los documentos se anexan al expediente

5. Análisis de patentabilidad (artículo 14 D486)

En cumplimiento del Art. 14 D486 se procedió a evaluar los requisitos de novedad, nivel inventivo y aplicabilidad industrial, con el fin de establecer la patentabilidad de la invención reivindicada de la solicitud en estudio.

5.1. Novedad (artículo 16 D486)

El requisito de novedad se evaluó por comparación entre lo solicitado y los documentos encontrados en el estado de la técnica y que se relacionan con el objeto reivindicado.

La presente Solicitud de Patente se refiere a un aparato para proveer un diagnostico del estado ortodóntico de un usuario. La reivindicación 1 se refiere a un aparato que comprende:

- Un dispositivo de captura de imágenes.
- Un mecanismo de enfoque conectado al dispositivo de captura.
- Una unidad de procesamiento central.

La anterioridad **D1** se refiere a un sistema de imágenes dentales **100** que extrae

imágenes fijas desde un video digital de la boca de un paciente. El sistema presentado en este documento comprende los siguientes elementos comunes a lo reclamado en la solicitud:

- Un mecanismo de captura de imágenes de movimiento **114** (Fig. 1, col. 4 líneas 1 a 4)
- Un dispositivo detector **110** que puede ser un dispositivo de mano que incluye un sistema óptico, o una cámara intraoral que es parcialmente insertada en la boca del paciente y orientada hacia la zona deseada (col 3. Líneas 9 a 17)
- Un mecanismo de procesamiento de datos **118** (Fig. 1)

Por otra parte, la anterioridad **D2** presenta un instrumento para medir la posición del plano oclusor de la boca con referencia a las características estructurales del cráneo. El instrumento presentado en esta anterioridad tiene las siguientes características comunes al objeto de la reivindicación 1:

- Un dispositivo para la medición de la posición del plano oclusor **10** (Fig. 1)
- Una mentonera **20** y un soporte **12** que forman un mecanismo de enfoque conectado al dispositivo de captura **10** (Fig. 1).
- Un microprocesador **16** (Fig. 1)

Como se puede ver las anterioridad **D1** y **D2** comprenden todos los elementos reclamados en la reivindicación 1, por lo cual esta reivindicación NO tiene novedad.

La reivindicación 2 especifica un dispositivo de salida conectado a la unidad de procesamiento para transmitir una comunicación verbal correspondiente al estado del paciente.

La anterioridad **D1** comprende también una interface de comunicación **132** que puede ser utilizada para videoconferencias entre especialistas en ubicaciones remotas (col. 4 líneas 25 a 31).

La reivindicación 3 especifica un dispositivo de entrada conectado a la unidad de procesamiento para aceptar información y transmitirla a la unidad central.

La anterioridad **D1** comprende un dispositivo de usuario de entrada/salida **131** conectado a la unidad de procesamiento **118** por medio de un bus de datos **150**, donde el dispositivo **131** recibe información o comandos del usuario y los transmite a la unidad de procesamiento (col. 3 líneas 31 a 44).

La reivindicación 5 especifica que la unidad de procesamiento esta localizada remotamente del dispositivo de captura de imágenes.

La figura 1 de la anterioridad **D1** muestra como el procesador **118** y el dispositivo de captura de imágenes **110**, son dispositivos separados localizados remotamente.

La reivindicación 6 se refiere a un dispositivo transmisor de datos que conecta la unidad de procesamiento con el dispositivo de captura de imágenes.

La anterioridad **D1** presenta un bus de datos **150** que conecta la unidad de procesamiento **118** con el mecanismo de captura de imágenes **114** (Fig. 1).

Como se puede ver, la anterioridad **D1** comprende todos los elementos relacionados en el pliego reivindicatorio de lo cual se desprende que la solicitud no tiene novedad.

Cabe anotar que el diagnostico de la condición ortodóntica del paciente es un uso del aparato, lo cual no constituye materia comparable con el estado del arte.

Como se observa, las características esenciales del objeto de esta solicitud son idénticas a lo comprendido en el estado de la técnica, por lo cual se considera que la solicitud no cumple con el requisito de novedad.

5.2. Nivel Inventivo (artículo 18 D486)

Como se demostró en el aparte anterior, las anterioridades D1 y D2 comprenden todos los elementos característicos reclamados en la presente solicitud. Sin embargo el solicitante presenta de manera poco clara algunos elementos adicionales que no están contemplados en ninguna de las anterioridades D1 o D2. Sin embargo estos elementos adicionales pueden derivarse de manera obvia del estado del arte, tal como se muestra a continuación:

La reivindicación 4 de la solicitud de la solicitud adiciona al aparato de la reivindicación 1 un componente de remuneración de servicios para recibir el pago del usuario.

La reivindicación 8 se refiere a una placa de material deformable

La reivindicación 9 se refiere a un área de almacenaje de dispositivos dentales.

La anterioridad D3 que se refiere a un aparato para diagnosticar la condición ortodontica de un usuario, comprende entre sus componentes:

- Medios de pago 60 (Figs. 2 y 3)
- Una placa deformable 10 (Fig. 1)
- Un aparato 20 que incluye una cámara de almacenaje para almacenar de manera adecuada los dispositivos dentales (col. 5 líneas 3 a 6)

Como se puede ver un técnico medio en el arte podría derivar de manera obvia la materia reclamada en las reivindicaciones mencionadas, adicionando los dispositivos enseñados en D3 a los instrumentos presentados en D1 y D2.

EN conclusión, la oficina considera que la materia reclamada en las reivindicaciones arriba mencionadas, NO tiene nivel inventivo por lo cual no cumple con lo dispuesto en el artículo 18 de la Decisión 486.

6. **Conclusión:**

Los requisitos de patentabilidad de la presente solicitud se encuentran afectados así:

Nº	Documento Nº	Reivindicaciones afectadas	Requisito que afecta
D1	US6093019	1 a 3, 5 a7	Novedad
D2	US5927973	1	Novedad
D3	US5882192	4, 8 y 9	Nivel Inventivo

7. **Respuesta a los argumentos del solicitante:**

Los argumentos presentados por el solicitante como respuesta al oficio No. 16050, fueron considerados, y se tuvieron en cuenta para realizar nuevamente el examen de

180
129

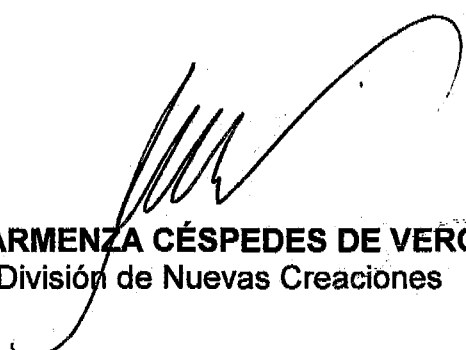
fondo, presentado en los párrafos anteriores.

Si el interesado considera que su solicitud, a pesar de lo dicho arriba contiene materia patentable, deberá presentar una o más reivindicaciones que definan la materia que se desea proteger, en forma clara, concisa y acorde a lo que establece la ley.

Se recomienda, que tenga en cuenta que el replanteamiento de esos apartes NO podrá implicar una ampliación de la protección que correspondería a la divulgación contenida en la solicitud inicial, de acuerdo a lo que establece el artículo 34 de la Decisión 486.

En cumplimiento del artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le indica que debe dar respuesta dentro del término de sesenta días contados a partir de la fecha de notificación de la presente comunicación. En caso de no dar respuesta al presente requerimiento, o si a pesar de la respuesta subsistieran los impedimentos para la concesión, se denegará la patente.

Notifíquese el presente oficio conforme a lo dispuesto en el numeral 5.2, literal e), del capítulo quinto del título primero de la Circular Única N° 10 de 2001.



ALIX CARMENZA CÉSPEDES DE VERGEL
Jefe de División de Nuevas Creaciones

El anterior requerimiento fue notificado por fijación en lista, de fecha
27 AGO. 2009

CONCEPTO TÉCNICO No. 2696	EXAMINADOR TÉCNICO Código No. 202082
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