HISTORY OF THE DURET RVG PATENT

Dr. Francois Duret on May 4, 1983 filed a patent for his invention of RadioVisoGraphy as a viable means of detecting intraoral pathology of the dentition and osseous structures of the patient. Patent number 2545349.

On June 2, 1983 Mr. Jean-Yves Sevestre, head of the Dental Division of Trophy Radiology, wrote a letter (1A) to Dr. Duret indicating interest in the advancement of Dr. Duret's research and proposed a possible collaboration on the project. Dr. Duret did not respond to the letter and at no time was there another letter sent to Dr. Duret to inquire about his desires or concerns. The letter was not delivered by certified or registered mail.

The Trophy Company in June 1983, March 1985, February 1986, April 1987, July 1990, and February and April 1991 filed patents to develop an RVG system which is in effect Dr. Duret's patent of 1983.

The important facts are as follows; Dr. Duret's patient was filed on May 4, 1983, Trophy Corporation letter was sent to Dr. Duret on June 2 of 1983 but the Trophy patent was filed on June 16, 1983.

At no time did the patent office or the attorneys for Trophy Radiology inform Dr. Duret of an impending patent which was infringing on his original patent.

Dr. Duret is the inventor of the RVG and did not give a license or agree to have Trophy Radiology use his patent to develop the RVG.

The letter of January 11, 1993 from Trophy Radiology, in response to Dr. Duret's letter, does not indicate that they do not want to have their patent used but instead they are refering to only the RVG TROPHY SYSTEM (1B). The company knows that Dr. Duret is the inventor of the RVG and that they followed his concept to develop their own RVG System.

Therefore, with consultation with Trophy, we desire to fully develop and to have a company or companies manufacture and sell the DURET (DRI) RVG SYSTEM.

The last letter (I C) by Dr. Duret to Trophy Corporation stating his desire to develop his RVG was sent by registered mail and received by Trophy on January 19th and a copy of the registered mail receipt is enclosed in the communication section between Trophy and Dr. Duret. Trophy Corporation was to have given a reply date of January 24th and Dr. Duret has not received a reply relative to his desire to develop his invention.

Therefore it is apparent that the way is clear to develop the Duret system.

1A

trophy radiologie
radiologie, cardiologie, matériel médical

Vincennes, le 2 Juin 1983

Monsieur DURET

Rue Paul Claudel

38690 - LE GRAND LEMPS

Pelletier

Monsieur,

Nous avons été très heureux de vous rencontrer à Nice et avons écouté avec intérêt la nature des recherches que vous entreprenez actuellement sur un système d'imagerie dentaire en temps réel.

Nous serions intéressés de suivre l'avancement de vos travaux et peut être pourrions nous définir une collaboration tant financière, technique que commerciale.

Dans l'attente de vous lire, nous vous prions d'agréer, Monsieur, l'expression de nos salutations distinguées.

JY SEVESTRE
DIVISION DENTAIRE

June 2, 1983 Monsieur Duret (TRANSLATION OF THIS LETTER)

Sir:

WE WERE VERY PLEASED TO MEET YOU IN NICE AND WE ARE LISTENING TO YOU WITH INTEREST ABOUT YOUR ACTUAL RESEARCH ON A DENTAL IMAGING SYSTEM IN REAL TIME.

WE ARE SERIOUSLY INTERESTED IN FOLLOWING THE ADVANCEMENT OF YOUR HARD WORK PERHAPS BEING TOGETHER WE DEFINE ONE COLLABORATION SO FINANCIAL, TECHNIQUE IS COMMERCIAL.

IN EXPECTATION OF YOU READING THIS, WE PRESUME TO ACCEPT , SIR, THE EXPRESSION OF OUR SINCERE SALUTATIONS.

JY SEVESTRE
DIVISION DENTAIRE

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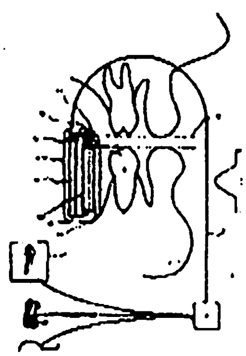
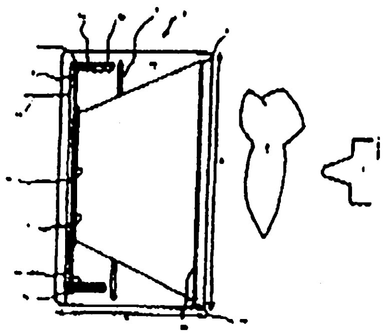
2.547.495 (A1) [83 10277]. — 16 juin 1983.
A 61 B 6/14. — Appareil permettant d'obtenir une image radiologique dentaire. — *MOUYEN Francis*, rep. par Scopi

L'invention a trait à la radiologie dentaire et concerne plus particulièrement un appareil permettant de faire apparaître sur le tube cathodique 7 d'une chaîne de visualisation l'image radiologique dentaire d'une dent irradiée.
Cet appareil est constitué :
— d'un générateur de rayons X extra-buccal 1;
— d'un capteur miniature extra-buccal 4 coaxial au faisceau de rayons X émergeant d'une dent 2 irradiée et constitué d'un dispositif à transfert de charges 10 et d'un écran 11 qui, accolé devant ce dernier, est composé d'un scintillateur 12 et d'une plaque optique de verre stabilisé 13, destinés à transformer les rayons X traversant la dent 2, en rayons du spectre visible acceptables par le dispositif 10, et à atténuer les rayons X ayant franchi le scintillateur;
— et d'une unité de traitement électronique extra-buccale 5 qui est reliée mécaniquement au capteur 4 par un câble souple 6, afin notamment de transformer les informations électriques en sortie du capteur 4 pour faire apparaître l'image de la dent 2 sur un tube cathodique 7, sur une imprimante 8, etc.
Applications : radiologie rétro-alvéolaire dentaire.



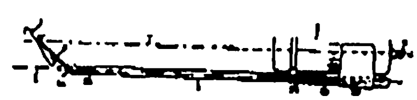
2.578.737 (A2) [85 04429]. — 15 mars 1985.
A 61 B 6/14. — Capteur intra-buccal pour un appareil permettant d'obtenir une image radiologique dentaire. — *MOUYEN Francis* et *SEVESTRE Jean-Yves*, rep. par Cabinet Scopi. — 1re addition au brevet 83 10277 pris le 16 juin 1983.

L'invention concerne des perfectionnements apportés au capteur intrabuccal de rayons X d'un appareil de radiologie dentaire, tel que décrit dans la demande de brevet 2 547 495.
Ce capteur 3 est formé par l'association d'un dispositif à transfert de charges 4 et d'un écran 5 qui, interposé entre ledit dispositif et la dent irradiée 2, est pourvu en entrée d'un scintillateur 6 transformant les rayons X ayant traversé la dent 2 en rayons visibles. Cet écran 5 est formé par des fibres optiques réductrices garnies de particules d'oxydes métalliques destinées à absorber l'énergie des rayons X non transformés par le scintillateur 6.
Cet appareil est remarquable notamment par le fait que les cristaux du scintillateur 6 sont inclus à l'intérieur des fibres optiques, en entrée de l'écran 5, sur une portion droite des fibres situées en avant de la partie réductrice.
Applications : radiologie rétro-alvéolaire dentaire.



2.651.987 (A1) [89 12613]. — 19 septembre 1989.
A 61 B 1/24. — Dispositif pour la prise de vues de corps masqués en totalité ou en partie, utilisable notamment dans le domaine dentaire — *MOUYEN Francis*, rep. par Cabinet Morelle & Bardou, SC.

L'invention concerne un dispositif destiné à la prise de vues ou à la transmission d'images de corps masqués en totalité ou en partie, ledit dispositif comprenant un miroir 1 disposé à l'extrémité 2a d'un manche 2, une source de lumière focalisée principalement vers ledit miroir et une caméra 3 montée sur ledit manche avec son axe de visée sensiblement dirigé vers ladite extrémité.
Ce dispositif est remarquable en ce que ladite extrémité 2a du manche 2 comporte une articulation 5a permettant de positionner ledit miroir 1 dans différents plans compris dans une plage angulaire allant de 200 à 90° par rapport au plan I contenant ledit manche.
Le dispositif de l'invention trouve une application dans le domaine dentaire où il est peut être utilisé pour la prise et la transmission d'images de l'intérieur de la cavité buccale.



Code: 405-17501
GCIC: 003/ERI

FRENCH PATENT NO. 2,545,349

Int. Cl.³:	A 61 B 6/00, 6/14, 10/00
Application No.:	83 07840
Filing Date:	May 4, 1983
Date of Public Access to Application:	BOPI "Brevets" No. 45 of November 9, 1984
Date of Public Access to Patent:	BOPI "Brevets" No. 39 of September 26, 1986
List of Documents Cited in the Search Report:	Refer to the end of the present fascicle

METHOD FOR THE ACQUISITION OF THE SHAPE OF HUMAN ORGANS OR PATHOLOGICAL ANOMALIES AND DEVICE FOR ITS IMPLEMENTATION

Applicant:	Francois Duret
Inventor:	[Not given]
Representative:	Germain et Maureau

The present invention relates to a method for the acquisition of the shape of human organs or pathological anomalies and the device for its implementation.

There exist different methods for the acquisition of the shape of a human organ.

The first consists of using X-rays which are perfectly suited for visualizing the contour and density of bone but which present the drawback of being dangerous beyond a certain value of irradiation; also, they cannot be used except for a very short period.

In addition, X-rays give only an imperfect image of nonosseous tissues, particularly soft tissues.

Other methods which use ultrasound, infrared or NMR (nuclear magnetic resonance) and $\beta+$ radiation have the advantage of not being dangerous, of giving a good image of the tissues, and of permitting the localisation of a zone of heating with regard to, for example, infrared radiation, but they do not give a precise image of the osseous masses, or [do so] only at very high costs requiring extensive implementation.

The existing techniques thus present a considerable lack in certain applications, such as the monitoring of an intervention in the dental, gastroenterological or pneumological fields, and they often make it impossible to monitor a surgical procedure whether in medicine or elsewhere.

For this purpose, the method which the invention deals with consists in conducting two [operations of] acquisition of shapes of the organ or organs considered, simultaneously or with a very slight delay in time, respectively, with X-rays and with other radiation, for example ultrasound, infrared or NMR, followed by the processing of these two types of information to obtain an image resulting from the superposition of two types of acquisition of shape.

The superposition of the data obtained from the operations of acquisition of shape permits the visualisation of a good osseous contour thanks to the X-ray and the visualisation of soft tissue organs or contours thanks to the other type of radiation.

According to an advantageous embodiment, this method consists in conducting, after the initial double acquisition of shapes, continuously or at predetermined time intervals, new operations of acquisition using a second radiation, for example ultrasound, infrared, NMR or ß+, and in superposing the images obtained in this manner over the initial image obtained with X-rays.

The image obtained with ultrasound radiation should be used particularly to follow dynamically general movements of bones or to monitor an intervention in the zone studied. The image obtained from infrared radiation should be used particularly to visualize physiological or pathological temperature increases.

Other characteristics of the invention will become clear after the following description of a certain number of embodiments of this method and a device to realize said embodiments with reference to the appended diagrammatic drawing in which:

Figure 1 is a block diagram of the realization of the two initial operations of acquisition of shapes;

Figure 2 is a block diagram corresponding to several successive operations of acquisition of shapes;

Figures 3 and 4 are two diagrammatic views of the adaptation of two different operations of acquisition of shapes;

Figures 5 and 6 are two views, one in a perspective view and one in cross section, of an apparatus for the operations of acquisition of shapes of a part of the lower jaw;

Figure 7 is a top view of the lower jaw and of two apparatuses permitting the acquisition of shapes;

Figures 8 and 9 are two views, one in cross section and one from below, respectively, of an apparatus permitting operations of acquisition of shapes of a part of the upper jaw of an individual;

Figure 10 is a very diagrammatic view of an X-ray capturing device;

Figures 11 through 13 represent three devices for the implementation of an acquisition of shapes;

Figure 14 is a general view of an apparatus permitting the acquisition of the shapes of the jaw of an individual from the exterior of the jaw;

Figure 15 is a detailed view of a part of this apparatus.

As shown in Figure 1 of the appended diagrammatic drawing, the method according to the invention consists in conducting an acquisition of shapes of the zone to be studied through the intermediary of X-ray (1), in conducting an analog-digital conversion of the information collected in a zone (2), in storing this information at (3), in making a skeletal representation at (4) of the contour of the shapes which have been acquired and of storing them at (5), then simultaneously or after a very short time delay, in initiating from a clock (6) an acquisition of shapes by means of infrared, ultrasound, NMR or $\beta+$ radiation at (7), in conducting an analog-digital conversion at (8) of the information collected, in processing, at the level of interface (9) or zone (10), the information from the capturing (7) and the zone of storage (1) of the contour, in order to realize a superposition of these two images at (11) which can then be stored in memory (12).

To the extent that subsequent capturing operations are conducted with the second radiation, the acquired shape is superposed over the initial shape of the contour obtained with X-rays and stored in memory (8).

According to another one of its characteristics, this method consists in realizing an adaptation of one or the other images to be superposed to permit a correct superposition of the images.

This adaptation of one or the other of the images is necessary to obtain a good superposition, to the extent that the emitter and/or receptor may be shifted during the operations of acquisition of shapes after the initial operations, with respect to the object itself, or to the extent that the emitters and receptors of the two types of radiation have different positions from each other and are independent.

Figure 2 represents a block diagram in which box (13) represents the acquisition of shapes by means of X-rays, with representation in skeletal form of the contour of the shapes at (14) before storage at (15).

The operation of acquisition of shapes by ultrasound, infrared or other radiation at (16), which is conducted simultaneously or nearly at time t0, produces a fuzzy definition of the osseous contour, but the definition is clear and with numerous details which cannot be defined by X-rays, of a duct (17), for example. This form is represented in skeletal form in (18), then, after treatment [is] superposed at (19) over the contour stored at (15), to obtain the image shown at (20). At a later period t1 a simple operation of acquisition of shapes with ultrasound, infrared or other radiations at (22) is conducted, which gives rise to the representation in skeletal form at (23), with the skeletal image being treated with respect to the initial contour using an adaptor which is represented diagrammatically at (19) producing at (24) an image obtained by the superposition of the stored contour obtained by X-rays and the shapes acquired at (22) by ultrasound, infrared or other radiations, allowing, for example, viewing probe (25) inside duct (17).

The adaptation of one or the other of the two images to be superposed can be obtained by using references consisting of a system of three points at least, or a grid, as diagrammed in Figure 3 before transformation to skeletal form. The three points or end points (grid/frame) are attached to the object, and will therefore undergo a change in shape if the angle of analysis of the captors varies with respect to the line perpendicular to the plane.

It is enough for the software to deform the image obtained until an exact superposition with a theoretical model of the grid is attained. The deformed global image corresponds necessarily to the same incidence as that of the initial view, and consequently the second view is superposable over the stored X-ray image of the first view. The principle can be repeated n times in real or delayed time during the entire analysis.

The advantage of this method is that it makes the software of correction and analysed image independent of each other, and that this correction can be made before transformation to skeletal form.

The adaptation of two views can be made taking into consideration the contours, as shown in Figure 4, where the contour obtained by X-rays as the reference (26), after transformation to the skeletal form and the acquisition of shapes attained by ultrasound initially carries reference (27), ensuring the obtention of image (28) by a superposition which must be adapted, (for later use), in view of its superposition over an image (29) acquired later. After adaptation, contour (28) was modified to form contour (30).

The second method of dynamic corrections consists in using as a base the knowledge of particularly clear and visible structures during the first ultrasound or infrared reading (contour of a vessel--osseous margin), in associating that knowledge with the reading of the X-ray view and in modifying the new reading as a function of the deformations in the projection of this organ onto the captor.

This system has the advantage of making unnecessary the use of references on the object, which requires a more complex software.

This adaptation can also be conducted dynamically by progressive correction during the deformation resulting from any phenomenon, by acting on the vectors of the image, which allows superposition at any time.

The principle of superposition of several images originating from, on the one hand, X-rays and, on the other hand, from infrared, ultrasound or NMR radiation, allows the monitoring:

- of a treatment procedure in the organ studied, such as penetration of a nerve extractor into a tooth, while preserving a fairly [clear] image of the tooth, thanks to the contour obtained with X-ray or,

- of a movement of the organ itself such as mandibular motion, associating the dynamic study of the movement of the mandible with a static view, while incorporating a certain number of data to detect possible pathologies.

It is possible to associate with the operations of acquisitions of shapes indicated above values of electromyographic recordings for the study of joint or mimic [facial] movements (ODF [expansion unknown]).

After having conducted the two initial operations of acquisition of shapes, it is possible to monitor the movements of the mandible, thanks to ultrasound or infrared radiation which provides information on the trajectories and flow rates of circulation and of muscle contractions, which can be confirmed by electromyography.

On the subject, during the movements, if the analysis deals exclusively with an organ in movement, it would be appropriate to keep as information of interest for the analysis only points whose vectorial information must be changed. It is known that mathematically a point which varies [moves] in space, has a vector which changes, while a fixed point does not vary [move]. By applying this principle to the analysis described above, it will be possible to monitor only the dynamic movements on a perfectly clear (X-ray) and static background.

It will be possible to monitor the movement of the muscles of a leg without opening, as it will be possible to monitor the progression of a medical instrument (nerve extractor-probe, etc.) practically without using any X-rays.

Thus, in association with electromyography or any other diagnostic method, progress in therapeutic research will thus be made.

It is therefore of interest to use this method for endodontic, prosthetic, periodontic, pedodontic or surgical diagnoses in medicine and dentistry.

Thus, in endodontics it is possible to monitor the progress made by milling instruments with respect to the pulp, the use of infrared radiation indicating a possible heating of the pulp. Similarly, it is possible to monitor the progress of endocanal instruments, thus avoiding trauma to the periapex, to provide guidance to the movements of the practitioner.

The extremities of the instruments used can be equipped with an infrared emitter to be better detectable (heating of the tip).

In the same manner, the use of infrared or ultrasound radiation associated with the contour [which is] stored in memory, obtained by X-rays, allows the localization and diagnosis of inflammations, cysts or other pathologies and the localization, without danger and at a maximum of precision, of the lesions.

On this subject, it should be noted that until now the association of an artificial coloring always referred to grey levels (better visual discrimination). It is proposed to index the colors not by grey levels of an image, but by the increases in temperature noted with the ultrasound, infrared and other techniques. The monitor would thus present a colored view in which each color would be a function of temperature. The temperature could reflect a pathological indication, and thus it would be possible for the practitioner to visualize the sensitive zones.

If the colors are automated by a connection to a pathology table, it would be possible to make a suggested diagnosis as a function of the response to the method used (difference between cyst-granuloma-infection, etc).

The application of this method in dental prosthesis allows [one] to locate the exact connection of the tooth to be treated and neighboring and antagonistic teeth with regard to bone level, and to better learn its mobility in all the directions and, consequently, its value as support and possibilities for drilling.

For this purpose, the determination of the pulp volume and above all its reaction to drilling is visualized by means of infrared and ultrasound radiation to provide a maximum of details (X-ray stored). An increase in temperature can manifest itself by a visual signal (different colors) or by a sound signal. The mobility can be ranked by the displacement of a limit represented in skeletal form of the teeth.

In the field of periodontology, the method according to the invention allows one to determine osseous, circulatory and nervous pathologies to better learn where to act and also how to monitor the action of the instruments during the procedure and after, using the techniques described above.

In surgery, it is possible to localize the tumors, the organs, the bones, the teeth, while at the same time monitoring the procedure being carried out and while studying the connections within the zone which is the object of the analysis with regard to veins and arteries namely. The monitoring of the displacement of the instrument allows one to avoid accidents.

The device for the implementation of this method comprises an emitter and receptor of X-rays located on both sides of the zone to be analysed, and an emitter-receptor for another radiation, ultrasound, infrared or NMR, located on the same side of the zone to be analysed, which is the side on which the X-ray emitter is located.

Figures 5 and 6 of the appended diagrammatic drawing represent an apparatus intended for the acquisition of shapes of several teeth of a lower jaw. This apparatus comprises an arch (32) intended to cover the zone to be studied, which is kept in place with respect to it [the zone], by means of a plate (33) which rests against the chin of the patient.

The proximity of the two edges of the arch are provided with canulas (34) for the suction of saliva.

On both sides of the arch (32) two small arches (35) are also provided which serve as a support for the cotton (36) which absorbs the saliva. One of arches (35) carries assembly (37) comprising X-ray emitters, as well as an emitter-receptor for another radiation, ultrasound, infrared or NMR, while the other arch (35) carries receptor (38) for X-rays.

This device is shown in cross section in Figure 6.

Figure 7 represents a jaw equipped with two types of apparatuses, a rectilinear apparatus (39) on its left side, such as the one shown in Figures 5 and 6, and in its central part an apparatus (40) along the curvature of the jaw.

Figures 8 and 9 of the drawing represent an apparatus intended for the acquisition of shapes of the upper part of the jaw. For this purpose, this apparatus (42) comprises at least one elastic arch (43) which can apply pressure against teeth (44) to which it must be attached.

On the side of the cheek, arch (45) is provided, which supports the cotton (46) which absorbs the saliva. This apparatus (42) carries emitter-receptor assemblies (37) and (38) placed on both sides of the tooth, similar to those described with reference to Figures 5 and 6.

It should be noted that the emitter and the receptor of X-ray radiation can possibly be withdrawn after the first acquisition of the shapes since they are no longer used for the remainder of the procedure. Under such conditions, it is necessary to preserve a strict referencing, to attach to the organ studied any reference independent of the emission and capturing system.

Advantageously, and as shown in Figure 10 of the drawing, the X-ray receptor comprises a scintillator (47), a system for the transmission of information through optical fibers (48) or by means of a mirror towards a captor such as a matrix or linear CCD photosensor (49).

The purpose of the scintillator is to transform the X-ray radiation into photons which can be analyzed by a CCD or a vidicon tube. If the photon analysis system is not in the mouth of the patient, an optical fiber placed behind the scintillator, or another system which transforms the X-rays into photons, transmits these photons to a CCD or a vidicon tube.

The use of a CCD is of great interest because it allows a maximum efficacy with a minimum of radiation, both with regard to the definition of the image and its digitization.

The infrared image is used with a capturing by vidicon tube or CCD sensitive at this frequency.

In the embodiment shown in Figure 11, the emitter (50) of X-rays and the receptor (52) are located on both sides of zone (53) studied, with emitter-receptor (54) of the other radiation being located on the same side as emitter (50). Receptor (52) and emitter-receptor (54) form an angle α which should be as small as possible to avoid the deformation of the image obtained by the X-ray radiation in comparison to that obtained by the other radiation. For this purpose, it is possible to play on [change as needed] the focusing of the infrared or ultrasound radiation; both radiation types obey the laws of traditional optics.

In the embodiment form shown in Figure 12, emitter (55) and receptor (56) of X-ray radiation are located on both sides of object (57) to be analyzed. The emitter-receptor (58) of the other radiation concentrically surrounds emitter (55).

In the embodiment shown in Figure 13, in which the same elements are designated by the same references as used in Figure 12, the emitter-receptor of the other radiation is not centered with respect to emitter (55) but shifted with respect to it. This implies the necessity of adapting one of the images to the other one.

Figures 14 and 15 represent an apparatus which permits the acquisition of the shapes of the jaw of an individual from the outside, requiring perfect immobility of the patient. For this purpose, a head support (59) and a device (60) for supporting the neck of the patient are provided, with emitters-receptors (62, 63) being placed on both sides of the jaw and intricately connected with a link (64) in the form of a helmet. This system can be attached to the practitioner's chair.

As shown above, the invention provides a great improvement to the existing technique by supplying a method which, when implemented, allows a cumulation of the advantages of several traditional methods, without the drawbacks of those methods.

Naturally, the invention is not limited to only the embodiment of the method or embodiments of the device described above, on the contrary, it covers all variants. Thus, notably, the emitter-receptor assembly for radiation other than X-ray radiation can be located on the side of the X-ray receptor.

Claims

1. Method for the acquisition of the shape of human organs or pathological anomalies for dynamic monitoring of an intervention, consisting in conducting a double acquisition of the shape of the organ(s) considered, on the one hand, with X-ray radiation and, on the other hand, with ultrasound, infrared or NMR radiation, for example, characterized in that it consists in first realizing, in a known manner, two operations of acquisition of the shape of the organ(s) considered, simultaneously or with a very slight time delay, respectively, with X-ray radiation or with another radiation, for example ultrasound, infrared or NMR, [consisting] in treating these two types of information to obtain an image resulting from the two operations of acquisition of shape, and then in conducting continuously, or at predetermined time intervals, new operations of acquisition using the second radiation, ultrasound, infrared or NMR, and in the superposition of the images obtained in this manner with the initial image obtained using X-rays.

2. Method according to Claim 1, characterized in that it consists in conducting an acquisition of the shapes of the zone to be studied through the intermediary of X-rays (1), in conducting an analog-digital conversion of the information collected in a zone (2), in storing this information at (3), in transforming into a skeletal form at (4) the contour of the acquired shapes and in storing them at (5), and then, simultaneously, or after a very short time delay, in initiating from clock (6) an operation of acquisition of the shapes by means of infrared, ultrasound or NMR radiation at (7), in conducting an analog-digital conversion at (8) of the information collected, in processing at the level of interface (9) or zone (10) the information from capturing (7) and from the zone for storage (1) of the contour, in order to realize a superposition of these two images at (11) which can then be stored in memory (12).

3. Method according to any one of Claims 1 to 2, characterized in that it consists in preparing an adaptation of one or the other of the images to be superposed, in order to allow a correct superposition of the images.

4. Method according to Claim 3, characterized in that the adaptation of one of the images for its superposition over the other image is obtained by a reference system comprising at least three points, such as a grid or a frame, attached to the organ whose shape is to be acquired, the grid of one of the images being deformed if necessary, before transformation to the skeletal form, in order to provide for superposition with the grid of the other image.

5. Method according to Claim 3, characterized in that the adaptation of one of the images for superposition over the other

image is obtained by deformation of the contour of the image considered, before transformation to skeletal form of the contour of the two images.

6. Device for the implementation of the method according to any one of Claims 1 to 5, characterized in that it comprises an emitter (50, 55) and a receptor (52, 56) for X-ray radiation located on both sides of zone (53, 57) to be analyzed, and an emitter-receptor (54, 58) for another radiation, ultrasound, infrared or NMR, located on the same side of the zone to be analyzed, which is the side on which the X-ray emitter is located.

7. Device according to Claim 6, characterized in that it comprises a scintillator (47), a system for the transmission of information by optical fibers (48) or by a mirror, towards a sensor such as a matrix or linear CCD photosensor (49).

8. Device according to any one of Claims 6 and 7, characterized in that in the case of its application to the acquisition of the shape of teeth, it comprises a piece (34, 43) in the form of an arch, intended to cover the part of the jaw comprising the zone to be studied, and carrying, at its extremities, on the one side (37) the X-ray emitter and the emitter-receptor for the other radiation, and on the other side the X-ray receptor (38).

9. Device according to Claim 8, characterized in that the part (34, 43) in the form of an arch, and the emitters and receptors (37, 38) for radiation are attached to the practitioner's seat.

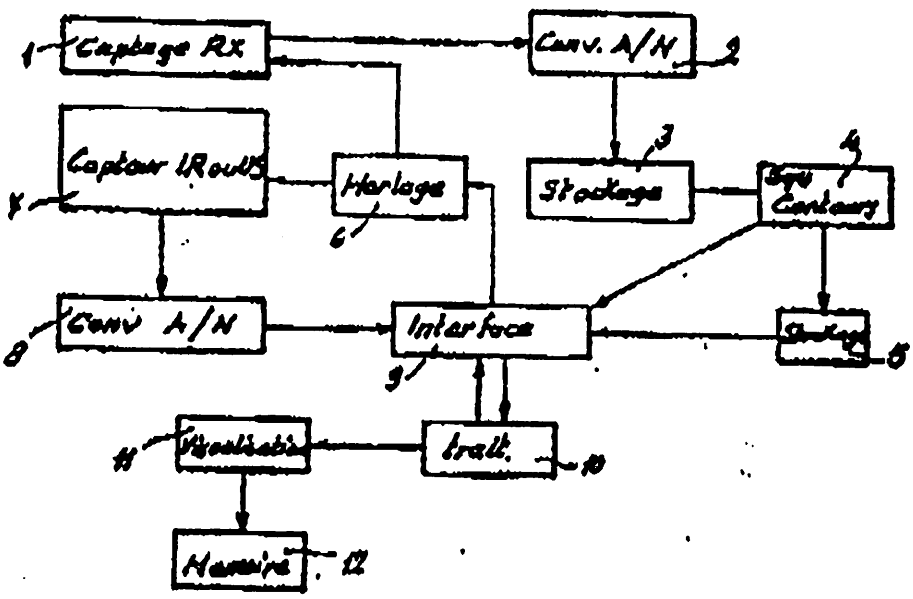


Figure 1

Key:
1 X-ray capturing
2 Analog/digital conversion
3 Storage
4 Transformation to skeletal form of the contours
5 Storage
6 Clock
7 IR or VS captor
8 A/D conversion
9 Interface
10 Processing
11 Visualisation
12 Memory

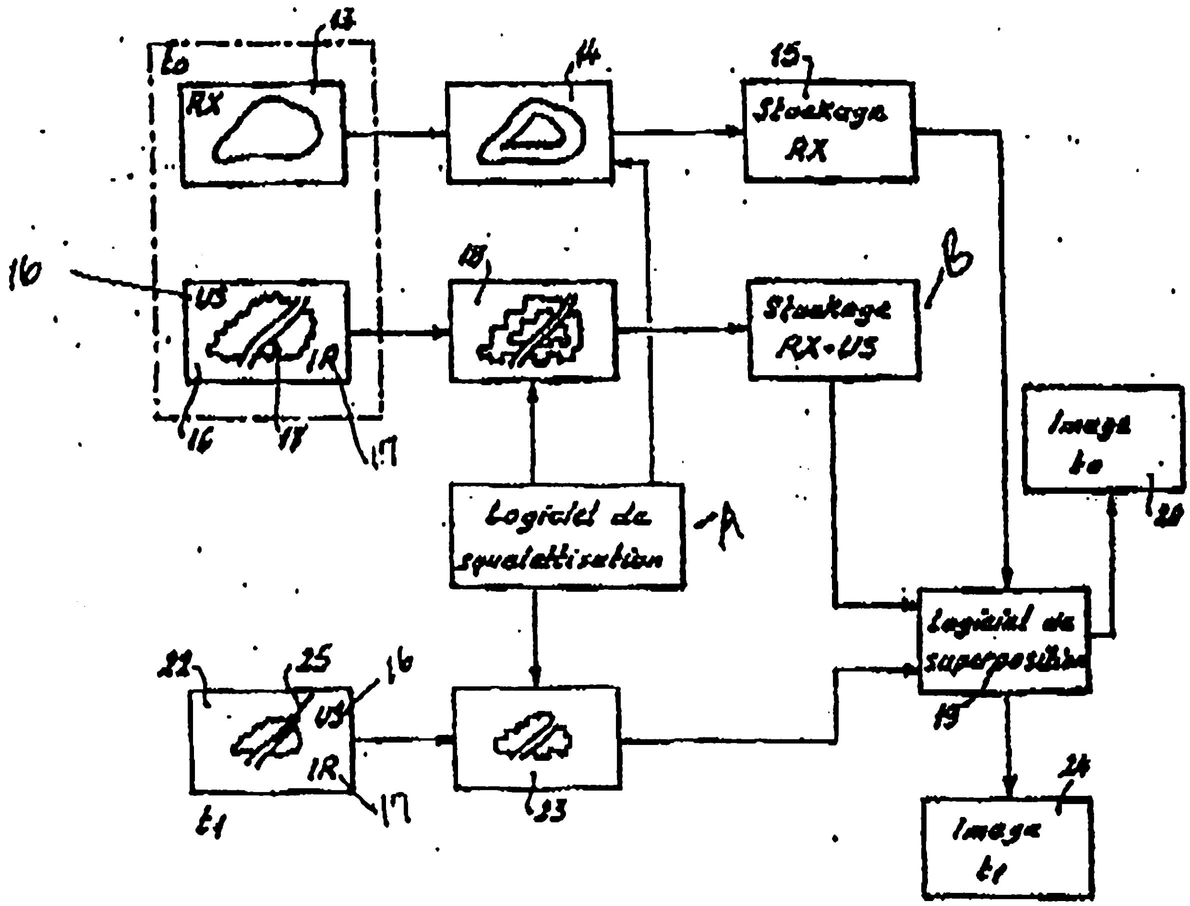


Figure 2

Key:
13 X-ray
15 X-ray storage
16 Visible radiation
17 Ionizing radiation
19 Superposition software
A Software for transformation to skeletal form
B X-ray-VS [visible radiation] storage

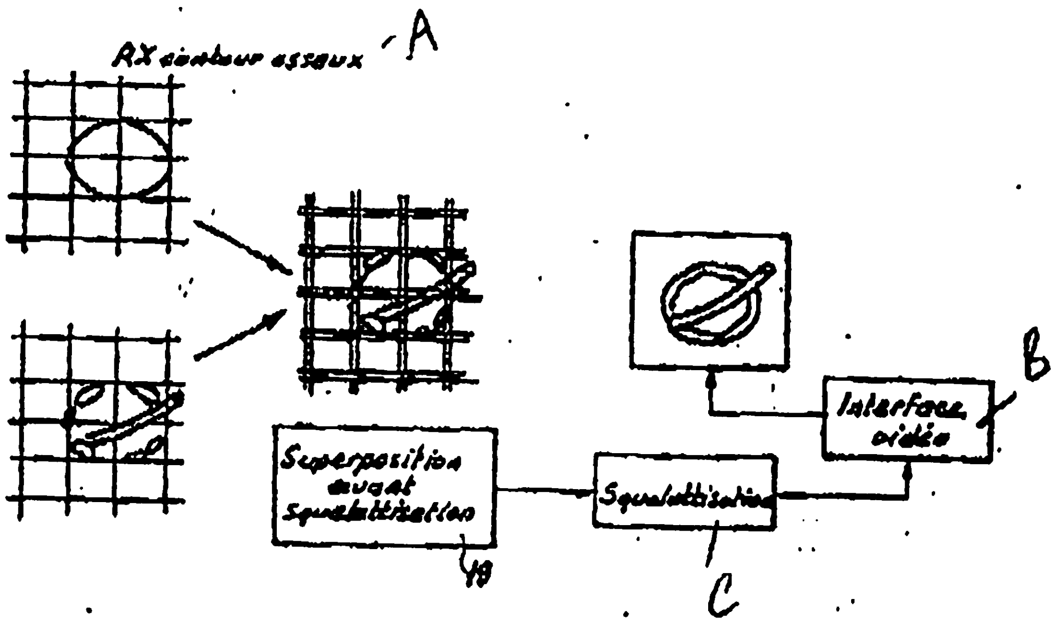


Figure 3

Key: 19 Superposition before transformation to skeletal form
A Osseous X-ray contour
B Video interface
C Transformation to skeletal form

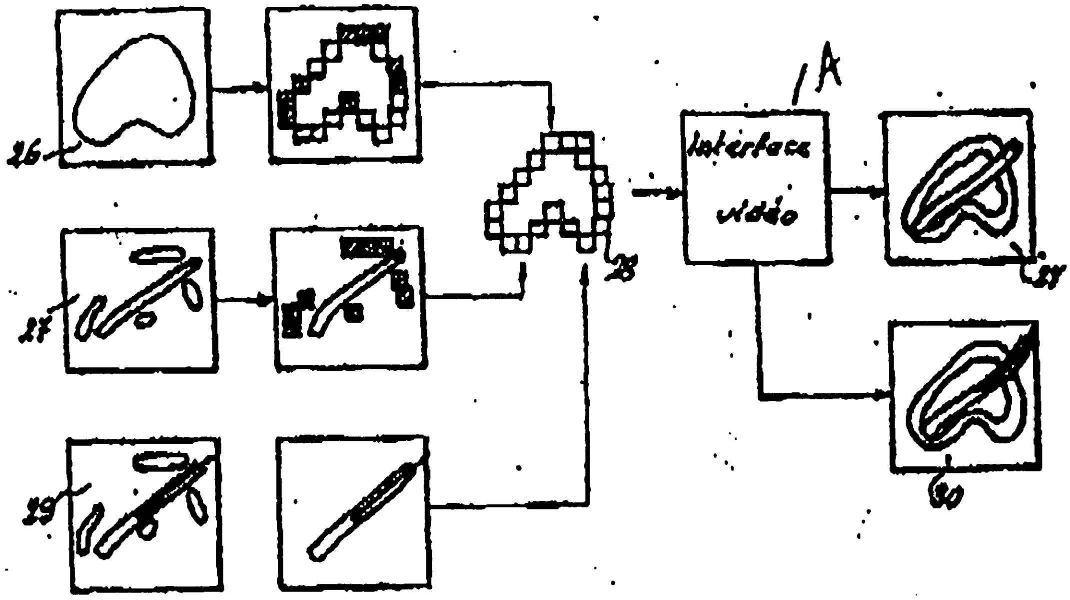


Figure 4

Key: A Video interface

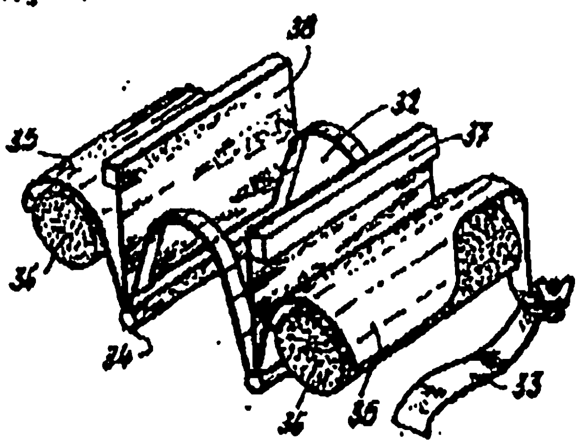


Figura 5

Figura 6

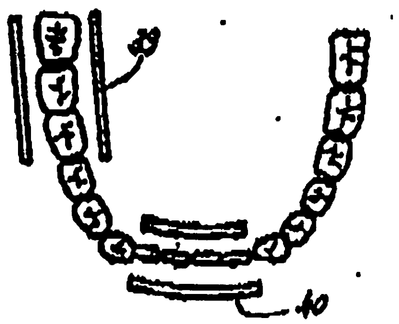


Figure 7

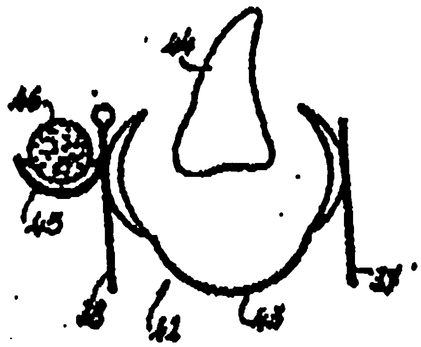


Figure 8

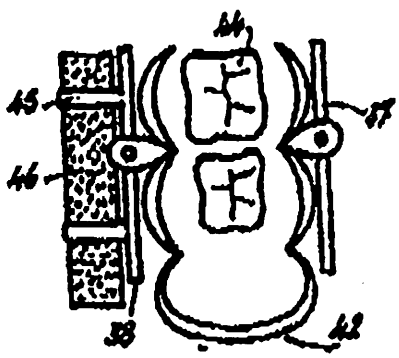


Figure 9

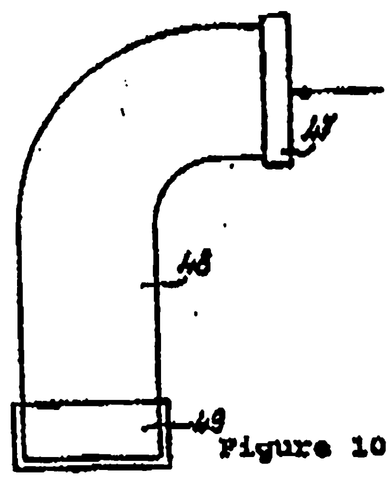


Figure 10

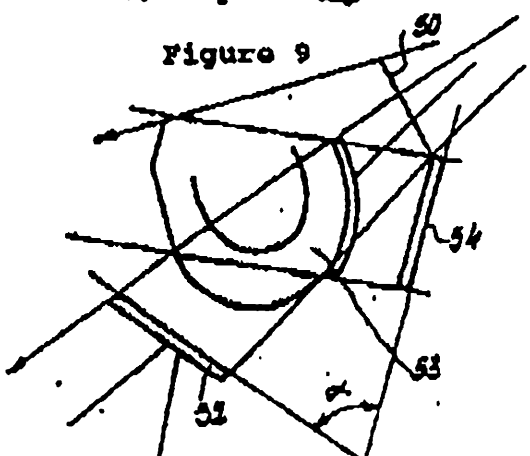


Figure 11

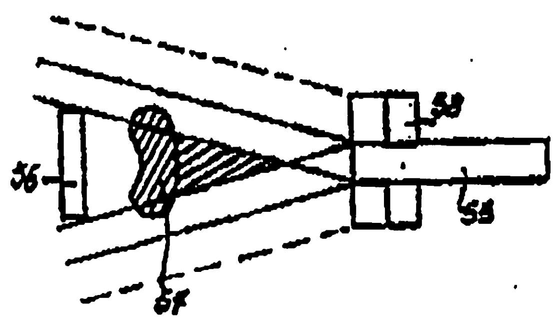


Figure 12

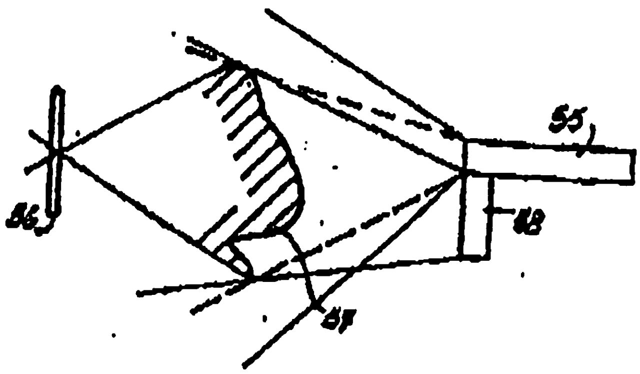


Figure 13

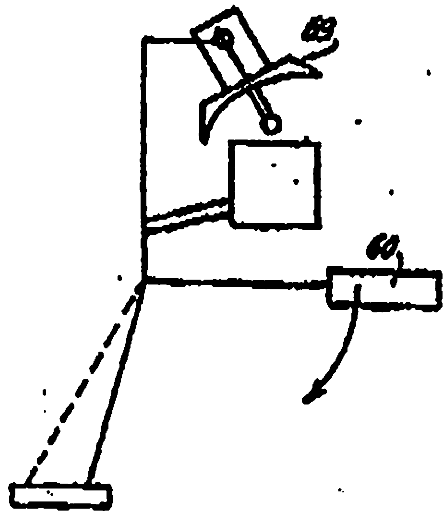


Figure 14

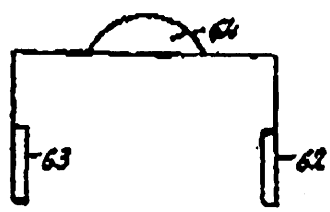


Figure 15