(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
7 August 2008 (07.08.2008)

PCT

(10) International Publication Number
WO 2008/093345 A2

(51) International Patent Classification:
A61C 1/12 (2006.01) *B25B 23/147* (2006.01)
A61C 8/00 (2006.01)

(21) International Application Number:
PCT/IL2008/000138

(22) International Filing Date: 3 February 2008 (03.02.2008)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/898,743 1 February 2007 (01.02.2007) US

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *without international search report and to be republished upon receipt of that report*

(54) **Title:** CORDLESS PRE-CALIBRATED TORQUE DRIVER WITH ABUTMENT HOLDER FOR IMPLANT PROSTHETICS AND METHODS OF USE

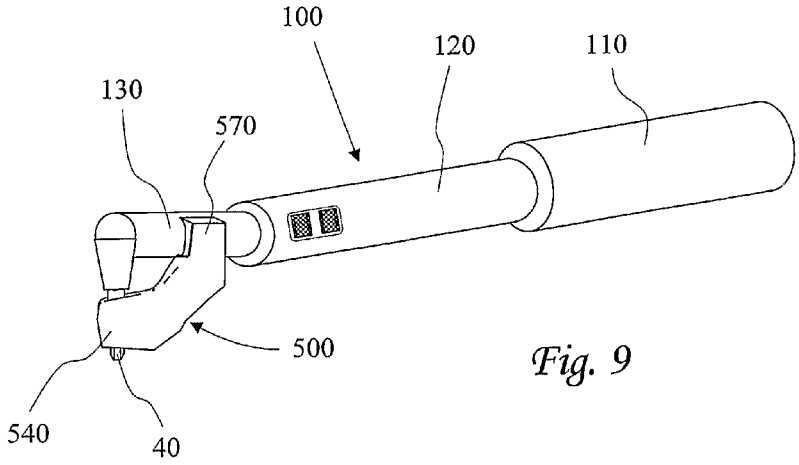

Fig. 9

(57) **Abstract:** A cordless pre-calibrated torque driver with a detachable abutment holder for driving prosthetics on dental implants. The main object of the present invention is to provide a portable cordless driver for prosthetics on implants with a pre-calibrated torque. The pre-calibrated torque is achieved by a special embodied mechanism on the motor shaft. Another object of the present invention is to provide a portable pre-calibrated torque driver with a detachable abutment holder, which prevents torque delivery to the implant whenever an abutment is tightened or released from it. The holder also enables easy access to posterior implants and one sole hand practice. For that purpose, the present Invention further provides for an organizing device designed to be used along with a cordless driver that can unload the healing caps from the driver. Using a single hand , a dentist can quickly load and unload healing caps from implants to said organizer and back, and abutments with an attached holder from laboratory model to implants and back and without risking implant stability in the bone by torque delivery from the driver (typically 25Ncm). These devices and methods significantly reduce chair time needed to restore dental implants and contribute to improve success rates of implants.

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CORDLESS PRE-CALIBRATED TORQUE DRIVER WITH ABUTMENT HOLDER FOR IMPLANT PROSTHETICS AND METHODS OF USE

CROSS REFERENCE TO RELATED APPLICATIONS

[Para 1] This application claims the benefit under 35 USC 119(e) from US provisional application 60/898,743 filed February 1st, 2007, the disclosure of which is included herein by reference.

FIELD OF THE INVENTION

[Para 2] The present invention generally relates to devices for dental implants, and more particularly to devices with pre-calibrated torque and with an abutment holder for driving prosthetics on implants and methods of use.

BACKGROUND OF THE INVENTION AND PRIOR ART

[Para 3] The term "handpiece" is a generic and euphemistic term for generic dental tools. A dental handpiece is typically held and operated by a dentist with a sole hand. The terms "driver", "handpiece", "dental handpiece", "contra angle handpiece" and "latch head" are used herein interchangeably. The driver as used herein also uses a contra angle head to accept latch burs.

[Para 4] The term "prosthetic screw" as used herein refers to screws used to attach various abutments, healing caps and copings to implants or their analogues, and "prosthetics" is the procedure of using those parts.

[Para 5] The term "driver tip" as used herein refers to interface of latch bur that are held and operated by a dental latch head handpiece and are suitable and fit to various prosthetic screw heads. A driver tip is also known as "chuck".

[Para 6] Today, dentists are using a hand driver for implant prosthetics and then a manual pre calibrated torque wrench to fasten the screws. Figure 1 depicts an example of a pre-calibrated torque wrench of prior art and Figure 2 depicts an example of an abutment holder of prior art, which are too weak to prevent rotation torque from an implant when applied by any kind of driver. While using a driver to fasten the abutment screw, a separate tool - an abutment holder,

such as abutment holder **80**, is also used to hold and position abutments, especially for posterior implants where there are limited access and poor visibility. Figure 3 illustrates a side view of an abutment **50**, having a hexagonal base **54**, designed for internal hex implant. Figure 4 depicts a latch driver tip **40** to fit screw head **53** (usually hex), an abutment **50** and abutment screw **52**, and Figure 5 illustrates the pre-calibrated torque wrench **20** shown in Figure 1, operatively used to tighten abutment **50** to implant hex **60**. Figure 5 illustrates implant **60** (internal hex) with hexagonal cavity **62**, into which the hexagonal base **54** of abutment **50** is inserted. When driver **15**, with/without torque wrench **20**, tightens screw **52** in clockwise direction **41**, abutment **50** deliver the torque **41** to the implant hex **62**. Similarly, the torque force is also transferred in a releasing action in the opposite direction.

[Para 7] While doing prosthetics on implants, the dentist needs to exchanges the healing caps (or healing abutments) with abutments prepared on a stone model. Generally, this try-in process is repeated several times, till a final satisfactory restoration can be delivered to the patient.

[Para 8] Furthermore, when healing caps are removed from the implants, the per-implanter tissue tends to cover implants edge in a minute, so it is important to work quickly, without losing the healing caps order or having dislodgements from the hand driver.

[Para 9] Another problem arises when using hand drivers: the dentist hand which is in or in front of the patient's mouth obscures his field of view. The "prosthetic parts driver for easy access to posterior implants" (SALVIN, USA-2006 catalogue) is built as a contra angle manual handpiece to cope with that problem, but it requires both hands and thus, even an abutment holder cannot be used at the same time and a torque wrench is still needed separately.

[Para 10] When trying to seat abutments for a fabricated bridge on posterior implants (try-in), access is difficult. Usually, assistance is required by an abutment holder. For example, US patent 6,471,515, given to Feuer, describes an abutment holder. This tool's grasping force is very limited like other existed today is used just to help to correctly position the abutment on the implant hex, with no connection to the action of screwing in the abutment screw ,There is therefore a need, and it would be highly advantageous to use easier and time consuming techniques for holding an abutment while driving its screw on implant.

[Para 11] Tightening an abutment to a fixture is done with a pre-calibrated torque wrench. The most popular wrench **20** with a preset torque is "DynaTorque wrench" (depicted in Figure 1). "3i" and "Antogyr" have manual contra angle preset torque wrench. The recommended torque value for tightening an abutment screw is usually 25Ncm. (To open, an extra torque of 3-5 Ncm is needed.) There is a strong debate on the accuracy of wrenches after prolonged usage (Accuracy

of implant torque wrench following time in clinical service, Int J Prosthodontics 1997 Nov-Dec; (6):562-7). It should be noted that the torque applied by any a hand driver or a wrench on the abutment screw, during tightening or releasing it, is delivered thoroughly to the connected implant, since the abutment tries to rotate inside the implant hex (internal hex). This action can cause, especially in early loading of an implant, at least a partial failure of the osseo-integration, means the connection in the bone-implant interface since micro-fractures of this biological connection might happen from that. To avoid this problem, dentists usually use lighter forces when tightening abutment screws in the prosthetic phase.

[Para 12] A pre-calibrated torque motor for prosthetics does not exist yet. Phisio-dispensers and endo torque devices are "torque controlled" by current changing (motor halt at once). This mechanism is not accurate like a "pre-calibrated torque" which is one accurate value sensed from the screw at distal end of shaft, that limits the torque delivered while motor still rotating (same principle as in the manual device) Similarly, "Nobelbiocare" presents with a drilling unit, Osseoset 200, that might work for tightening prosthetics with variable speeds and torque control – again, neither the pre-calibrated torque nor the method of this invention.

[Para 13] US patent 6,607,385, given to Sevcik et al, provides a method and a device added to an existing dental and surgical handpiece for limiting the torque to a preset force. The suggested device is a whirred device (an outer, not embodied mechanism) designed for screwing in implants (not for prosthetics), without the intention to cope with posterior abutment access, nor using any holder.

[Para 14] Single hand technique for driving prosthetics on implants requires an electrical cordless preset torque driver. Today, only endodontic cordless devices like Endomate TC ("NSK"), and TRI auto ZX ("J. Morita") exist in the market. They use a geared latch head with a plastic body. Like many other endo torque devices they have "torque control" and auto-reverse mechanism. While TRI lacks a "start button" on the handpiece neck, the Endomate is operated by one momentary finger key (forward) - not two independent (forward and reverse) as provided by the present invention. Both devices use rechargeable batteries and own a control panel on the rear plastic body to determine torque (values are too small for prosthetics) and speed, depending on the endodontic file used, resistance, etc.

[Para 15] US patent 4,355,977, given to Ota et al, and US patent 4,619,614, given to Baba et al, are examples of improvements to cordless dental handpieces with batteries storage and an incorporated electric motor for other than implant treatment, so torque and speed do not suit driving prosthetics on implants.

[Para 16] There is therefore a need for a cordless preset torque tool for driving prosthetics quickly by sole hand in one step.

[Para 17] During the prosthetic stage for dental implants the dentist takes the healing caps off the implants and places them in patient's tray, while trying to keep them in order. One hand method requires a special organizer to load and unload the healing caps with the driver.

[Para 18] Prior art devices offer various trays such as described in WO0057810, given to Kvarnstroem Bjarne et al, WO2004100819, given to Barnes Richard, GB1507325 given to Kaj Backstrom et al, and others. None of the prior art tray devices are designed to firmly hold healing caps by matching the healing caps threads and/or the abutment holder that is part of this invention.

[Para 19] There is therefore a need for a dentist using a single hand technique to have an organizing tool that unloads / loads healing caps from/to the driver, thus enable fast exchanging with abutments before the gums partially cover the implants.

SUMMARY OF THE INVENTION

[Para 20] The principal intention of the present invention includes providing a cordless preset torque driver, with a detachable abutment holder for driving prosthetics quickly onto and from implants in the limited space of a human being mouth.

[Para 21] An aspect of the present invention is to provide a cordless prosthetic parts driver with a detachable abutment holder to ease access and allow a single hand technique. The abutment holder provided by the present invention functions simultaneously with the driver. The simultaneous use of the driver band the abutment holder enables a single hand practice with abutments and improves the access to the inner teeth implants. .

[Para 22] According to the teachings of the present invention a cordless, contra angle, pre-calibrated torque prosthetic parts driver for dental implants is provided. The driver includes: (a) an electric motor with gear mechanism; and (b) A latch head capable of holding a latch bur with various tips operatively adaptive to various prosthetic screw heads to various driver lengths matching various heights of abutments; and (c) a pre-calibrated torque mechanism having a preset torque value. The electric motor with gear mechanism is capable of turning the latch head in forward and backward directions.

[Para 23] The present invention further includes an abutment holder, preferably detachable, that enables driving abutments with a single hand technique without transferring torque to the implants. The abutment holder includes a mechanism for grasping an abutment and a mechanism

for attaching the holder to the driver latch head. The grasping mechanism firmly holds an abutment and prevents the abutment from rotating, and thereby prevents the transfer of torque forces from the abutment to a coupled implant, when the abutment is being driven into the implant or out of the implant.

[Para 24] The present invention further provides, as part of the single hand method, an organizing device that includes orderly tapped holes with various screw threads, to hold healing caps and/or healing abutments.

[Para 25] The pre-calibrated torque mechanism includes two discs, two latches in grooves and a retaining spring ring. The spring ring holds the discs together and sets, together with the shape of the grooves, a single pre-calibrated torque value, thereby preventing a prosthetic screw from being tightened with a force surpassing the pre-calibrated torque value, and wherein when the tightening force reaches the preset torque value, the latches overcome the force applied by the retaining spring ring thereby disengaging the two discs, and thereby causing a temporary separation of the latch head shaft from the driver motor shaft.

[Para 26] Using the cordless driver of the present invention together with the organizer of the present invention, the dentist, by one hand, can load and unload healing caps between patient's mouth and the organizer, and abutments between the laboratory model and the implants with a preset torque.

[Para 27] The driver of the present invention replaces three prior art devices: a hand/manual driver; an abutment holder, which requires a second hand; and a manual pre-calibrated torque wrench.

[Para 28] The driver provides an easier access to posterior fixtures. Compared to the using of a hand driver with a regular abutment holder, driver tip here is already within the screw of a grasped abutment, so only 20mm of vertical space is needed for mounting the abutment onto a vacant implant, while even when using the shortest hand driver, the fingers used and the abutment height require more than 30mm of space above the fixture.

[Para 29] Hence, one aspect of the present invention is to provide a cordless, contra angle driver for driving prosthetic parts, especially on posterior implants with a pre-calibrated torque. The pre-calibration is done by a special embodied mechanism.

[Para 30] Another aspect of the present invention is to provide a cordless prosthetic parts driver with abutment holder to ease access and allow safer sole hand techniques.

[Para 31] An aspect of the present invention is to provide a tool that will "hold and release" healing caps in a certain order, during prosthetic procedures, thus allow for a single hand method.

[Para 32] The pre-calibrated torque driver may also be used with a straight nose cone (better access to areas like anterior maxilla).

[Para 33] The drivers of the present invention typically use an electric motor, typically powered by batteries, placed in a battery compartment and hence the driver is referred to as a cordless driver. But the present invention is not limited to a batteries powered motor and the driver of the present invention can be also powered by an external electric power or by compressed air, as exists in dental units.

BRIEF DESCRIPTION OF THE DRAWINGS

[Para 34] The present invention will become fully understood from the detailed description given herein below and the accompanying drawings, which are given by way of illustration and example only and thus not limitative of the present invention, and wherein:

FIG. 1 (prior art) depicts an example of a pre-calibrated torque wrench of prior art;

FIG. 2 (prior art) depicts an example of an abutment holder of prior art;

FIG. 3 (prior art) illustrates a side view of an abutment designed for internal hex implant, including an enlargement of the undercut area;

FIG. 4 (prior art) depicts a latched driver tip, with an abutment and the abutment screw;

FIG. 5 (prior art) illustrates the pre-calibrated torque wrench shown in FIG. 1, operatively used to tighten an abutment to the implant hex with a designated screw, optionally using a hex driver;

FIG. 6 illustrates a cordless pre-calibrated torque driver with mini latch head, according to an embodiment of the present invention;

FIG. 7 illustrates a cordless pre-calibrated torque driver with a straight nose cone, according to an embodiment of the present invention;

FIG. 8a is a side perspective view illustration of an abutment holder, according to the preferred embodiment of the present invention;

FIG. 8b is a top perspective view illustration of the abutment holder, shown in FIG. 8a;

FIG. 8c is a bottom view illustration of the abutment holder, shown in FIG. 8a;

FIG. 9 illustrates the cordless pre-calibrated torque driver shown in FIG. 6, with the abutment holder, shown in FIG. 8a, attached to the driver;

FIG. 10 illustrates the cordless pre-calibrated torque driver shown in FIG. 6, with a healing cap (abutment holder detached;

FIG. 11 depicts the cordless pre-calibrated torque driver shown in FIG. 6, assembled with an abutment and the abutment holder, shown in FIG. 8a.

FIG. 12 depicts an organizer for attaching healing caps and hold other accessories, according to embodiments of the present invention;

FIG. 13 is a schematic block diagram illustrating the usage of the driver with the organizer, according to an embodiment of the present invention;

FIG. 14 depicts a laboratory stone model of implanted jaw with two analogues and abutments;

FIG. 15 is a frontal view of the pre-calibrated torque mechanism, according to an embodiment of the present invention;

FIG. 16 is a partial cross section lateral view of the pre-calibrated torque mechanism, according to an embodiment of the present invention; and

FIG. 17 illustrates the interface between the contra angle latch head and the pre-calibrated torque mechanism, according to an embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[Para 35] The present invention will now be described more fully hereinafter with reference to the accompanying drawings, in which preferred embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided, so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art.

[Para 36] Unless otherwise defined, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs. The methods and examples provided herein are illustrative only and not intended to be limiting.

[Para 37] By way of introduction, the principal intentions of the present invention include to provide a cordless device for driving prosthetic parts on implants with a pre-calibrated torque, and a one hand method of using it. The pre-calibration is done by a special embodied mechanism. Another object of the present invention is to provide a cordless driver with an abutment holder that improves access to posterior implants.

[Para 38] It should be noted that regarding effectiveness, the driver of the present invention is clearly more effective than prior art drivers, since the prior art abutment holders are simple grasping tools that occupies one of the dentist's hands (while holding a conventional driver in the

other), while the abutment holder of the present invention is self-held, attached to the handpiece, allowing a single-hand-technique while leaving one of the dentist's hands free for other tasks. Above all, the abutment holder protects the implant from the torque used to tighten/release the abutment screw by producing an equal anti rotational moment to counteract and absorb that torque in the connected driver's head. Furthermore, the abutment holder is a miniature tool which almost completely eliminates the problem associated with prior art practice, of worksite obscuring.

[Para 39] By way of introduction, other intentions of the present invention include to provide a single hand method with an organizing device that quickly unloads the healing caps from the driver. The organizing device includes orderly tapped holes with various screw threads to hold healing caps and a special compartment to load/unload the abutment holder by sole hand. The device is a supporting device for a dentist, especially when using a driver with a single hand, according to the present invention. The dentist can efficiently unload on the organizing device healing caps. For the sake of clarity, the organizing device can be used also for healing/temporary abutments and any other dental item, various driver tips, etc.

[Para 40] Reference is now made to the drawings. Figure 6 illustrates cordless pre-calibrated torque driver **100** with mini latch head **130**, according to embodiments of the present invention. Rear part **110** of the body of driver **100** may serve as a batteries compartment and the shape of rear part **110** can be adapted to the batteries type used. Middle part **120** of the body of driver **100** preferably contains a motor and a gear, including a pre-calibrated torque mechanism. This is the preferred arrangement but the present invention is not limited to the described arrangement. For example, the torque mechanism or gear can be built inside head **130** of device **100**.

[Para 41] Driver **140** illustrated In Figure 7, illustrates an option of using a straight nose cone **142** instead of contra angle, which functions as anterior upper jaw screwdriver or as orthopedic screwdriver.

[Para 42] As shown in Figure 3, abutment **50** preferably includes flattened anti-rotational area **55** and small undercut area **56**, two useful components for enhancing the grabbing method.

[Para 43] Reference is now made to Figure 8a, which is a side perspective view illustration of abutment holder **500**, according to the preferred embodiment of the present invention. Figure 8b is a top perspective view illustration and Figure 8c is a bottom view illustration of abutment holder **500**, shown in Figure 8a. Abutment holder **500**, as well as other abutment holders, operatively stops and/or prevents the rotation of abutment **50**, when being attached or detached by cordless pre-calibrated torque driver **100**.

[Para 44] Reference is now made to Figure 11, which illustrates cordless pre-calibrated torque driver **100**, assembled with abutment **50** being held by abutment holder **500**, shown in Figure 8a. Reference is also made to Figure 10, which illustrates cordless pre-calibrated torque driver **100**, with a healing cap **70** (abutment holder not attached). When operating driver **100**, the motor operatively turns either healing cap **70** or abutment screw **52** in or out (as desired), as respectively shown in Figures 10 and 11. The shape and/or diameter of insert **550** respectively adapted to the shape of the selected abutment **50** and to the length of the tip of driver **40** being disposed into hex cavity **53** of abutment screw **52**.Hence, each abutment holder **500** is specific to each abutment **50** design. While tightening a screw **52** in direction **41** with torque driver **100**, abutment holder **500** stops and prevents rotation of abutment **50**. The torque pressure on flattened area **55** is transferred to fastening arms **570** which absorb the transferred torque by the contact areas with the body of driver **100**. It should be noted that more than one flattened area might be in the circumference of abutment **50**. Similar transfer of torque force occur when opening a tightened screw **52** with driver **100** having abutment holder **500** attached to driver **100**. This principle is very useful for handling dental implants, since the torque is prevented from being transferred to the implant, unlike all other tools or methods known today, that transfer the applied torque directly to the implant, through hex **62**, and risk the implant connection with the surrounding bone. The torque transferred to implant may also cause an implant to fail, especially when dealing with early loading when just part of the osseo-integration has occurred.

[Para 45] Reference is also made to Figures 15 and 16. Figure 15 depicts a frontal view of pre-calibrated torque mechanism **400** including motor shaft **450** of driver **100**, according to embodiments of the present invention. Figure 16 is a partial cross section AA' lateral view of pre-calibrated torque mechanism **400**, shown in Figure 15. When screwing in abutment **50**, the first momentary press key **122** (see Figure 6) is pressed ("in", for example) and torque mechanism **400** terminates the spin of a screw at a preset torque force while motor **450** continues to run. When unscrewing, a separate second momentary press key **122** is pressed ("out", for example) and the screw will receive the full motor force, due to asymmetrical shape of grooves **422** that do not allow torque limiting mechanism to operate when opening a screw. This usage of the torque force is the preferred method, but the present invention is not limited by it, and any other mechanism can be utilized, including various preset torque values in the mechanism.

[Para 46] The tightening /releasing method of abutment **50** enables a one hand technique. An abutment is typically located with flattened side **55** preferably pointing towards the buccal side (lips side), to allow access and fitting to flat area **555** of insert **550** direction of holder **500**. Figure

14 depicts a laboratory stone model **90** of implanted jaw with two analogues **60** and abutments **50**. After releasing screw **52**, abutment **50** is taken from model **90**, positioned and tightened as is in the patients' mouth.

[Para 47] Abutment holder **500** shown in Figure 8a is given as examples only and other embodiments of such holder and attachments to latch head **130** can be designed and used.

[Para 48] Figure 9 depicts driver **100** assembled with abutment holder **500**, ready for operation, according to embodiments of the present invention. Abutment holder **500** is stably attached to the latch head **130** by fastening arms **570**.

[Para 49] Optionally, abutment holders **500** include a hole **560** respectively, which is used to mount abutment holders **500** onto a corresponding pin **160** on latch head **130** (see Figure 10), and thereby abutment **50** can be held at a proper distance from latch driver tip **40**.

[Para 50] The operational steps of using driver **100** will now be described coupled with abutment holder **500**, but the present invention in not limited by to abutment holder **500**, and any other abutment holder can be designed to perform the task of stopping and/or preventing the rotation of abutment **50** and thereby prevent the transfer of torque moment to implant **60**.

[Para 51] In embodiments of the present invention the abutment holders, such as abutment holder **500** are attachable/detachable to/from driver **100**.

[Para 52] In embodiments of the present invention the abutment holders, such as abutment holder **500** are affixed to driver **100**.

[Para 53] The operational steps of using driver **100** with abutment holder **500**, to transfer an abutment **50** between a laboratory model **90** and patient's **10** mouth, are as follows:

a) Place the latch driver tip **40** onto screw **52** of abutment **50**, while insert **550** with properly directional flattened area **555** grab flattened area **55** of abutment **50** positioned on model **90**.

b) Turn on motor **450** of driver **100** in rewind direction to catch screw **52** and to release abutment **50** from model **90** and hold abutment **50**. Figure 11 illustrates driver **100**, assembled with abutment **50** being held by abutment holder **500**.

c) Transfer held abutment **50** to the patient's mouth maintaining respective position as on hexagonal analogue base **54** in stone model **90**

d) Turn on motor **450** in forward direction to attach abutment **50** to implant **60** using the appropriate torque (typically, a clicking sound is heard when done).

e) Pull to detach device **100** from abutment **50**.

f) After try–in the process is done same way vise versa.

[Para 54] The present invention also provides for an apparatus that facilitates an efficient, flexible and user–friendly method to take out healing caps **70** with every check of bridge structure (porcelain on metal or zirconium) in patient's mouth. Reference is also made to Figure 12, which illustrates organizer **200**, according to embodiments of the present invention. Using a single hand, the dentist loads the healing caps **70** and unloads them into special organizer **200**, developed for that purpose. An organizer of the present invention can take different shapes and layouts with any number of threaded holes **218**.In organizer **200**, for example, the layout of threaded holes **218** are designed to simulate the mouth structure and thus enables keeping healing caps **70** in implants location order. Organizer **200** also contains compartments **212** that can hold other items and a compartment **214** to fit and catch abutment holder **500** on "abutment like" structure (possibly exchangeable) and a compartment **215** to hold the driver when not in use.

[Para 55] During preparation of a porcelain fused to metal bridge (or any other type), the restorative dentist needs to transfer abutments **50** from the laboratory model **90** to patient's **10** mouth and back several times, before the final restoration takes place. When trying-in the abutments **50**, the dentist needs to take out healing caps **70**. It should be noted that after taking out healing caps **70** from implants **60**, the working time should be as short as possible, before gums partially cover the vacant implants **60**. Organizer **200** helps to shorten that time.

[Para 56] Referring to Figure 13, a schematic block diagram illustrating the method of usage of driver **100** with organizer **200**, according to an embodiment of the present invention, is shown. The restorative dentist takes (action **210**) healing caps **70** out of the mouth of patient's **10**, and puts them in a designated location in the organizer **200**. Operating motor **450** for a second forward will position a healing cap **70** firmly in the threaded hole, so it stays there when pulling up the driver. The dentist now using device **100**, attaches holder **500** from compartment **214**, takes every abutment **50** from the laboratory model **90**, and attaches (action **220**) each abutment **50** onto a vacant implant **60**. After checking and determining accuracy of abutments grinding and bridge fabrication, the process continues in a reverse order. The dentist removes abutments **50** from implants **60** and puts (action **230**) them back onto laboratory model **90**, using device **100** with the still attached holder **500**. Then, dentist detaches holder **500** by pressing holder **500** down with the thumb and the finger on the lower edges, preferably back to compartment **214** in organizer **200**. The last step is to put (action **240**) healing caps **70** back from organizer **200** onto

vacant implants **60**. As explained, in steps **210** and **240**, holder **500** is not in use and is preferably held in organizer **200** (It is useful also for autoclaving the holder).

[Para 57] It should be noted that when holder **500** is not needed as an anti-rotational device, for example when screwing in or out healing caps **70** (as shown in Figure 10), which are typically made of one piece, then holder **500** is detached from head **130** by pulling down fasteners **570** using two fingers on holder **500** bottom into organizer cavity **214** with small "abutment like" pillar. Attaching holder **500** from cavity **214** in the organizer **200** to the driver **100** is done easily by one hand while pressing on fasteners **570** using neck **130** of driver **100**.

[Para 58] When screwing an abutment screw **52** in, screw **52** spin is terminated when the torque force needed reaches the pre-calibrated torque value, as pre designed into mechanism **400**. Referring to Figures 15 and 16, one embodiment for presetting the threshold torque force is shown, but the present invention is not limited by it, and any other mechanism known in the art can be used, including a mechanism that gives two or three preset torque values.

[Para 59] In this embodiment, the mechanism includes two discs (**410** and **420**), two latches **430** (connected with pins to disc **410**), and a retaining ring **440** that presses the free ends of latches **430** into sloped grooves **422** in disc **420**. Spring ring **440** can be any type of spring, including spring ring, retaining ring, rubber o-ring and so on and so forth. It should be noted that it is possible to change spring ring/o-ring **440** by the user and thereby change the preset torque value.

[Para 60] Figure 17 illustrates the interface to the pre-calibrated torque mechanism, according to an embodiment of the present invention. Bearing **426** which is part of an altered "doriot" latch head **130** has a pin **427** that is operatively inserted in gap **421**in disc **420**.

[Para 61] Referring back to Figures 15 and 16 as well as to Figure 17, the first disc **410**, firmly attached to motor shaft **450** and turns with the motor shaft. Disc **410** owns two latches **430**. The free ends of latches **430** are held by a retaining ring **440** in grooves **422** within torque disc **420**, such that all rotate with the motor shaft as a single unit. But when the resistance from a screwed in screw **52**, sensed by torque disc **420** through pin **427** that was inserted in gap **421**, exceeds the pre-calibrated torque value, latches **430** (while pushing the retaining ring **440**) get out (step **442**) from sloped grooves **422**. After the separation of discs **410** and **420**, motor shaft turns without transferring more torque to screw **52**. The preset torque value is achieved by a combination of the angle of slopes **422** and retaining ring **440** force. Latches **430** return **442** into grooves **422**, only if the torque applied on torque disc **420** by pin **427** is again below the pre-calibrated torque value. If motor **450** is still activated, battery energy is preserved, since motor

450 is not "stuck", but the clicking sound is an indication to stop it. Grooves **422** which are not symmetrical, allow latches **430** to get out above the preset torque only in forward direction of motor **450**; thus rewind operation needed to open a tightened screw takes advantage of the full motor torque.

[Para 62] In embodiments of the present invention driver **100** is used for endodontic applications and/or for implantology.

[Para 63] The invention being thus described in terms of embodiments and examples, it will be obvious that the same may be varied in many ways. Such variations are not to be regarded as a departure from the spirit and scope of the invention, and all such modifications as would be obvious to one skilled in the art, are intended to be included within the scope of the following claims.

What is claimed is:

1. A cordless, contra angle driver for driving prosthetic parts on dental implants, comprising of:
   a) An electric motor with gear mechanism;
   b) A latch head capable of holding a latch bur with various tips operatively adaptive to various prosthetic screw heads to various driver lengths matching various heights of abutments.
   c) A pre-calibrated torque mechanism having a preset torque value;

wherein said electric motor with gear mechanism is capable of turning said latch head in forward and backward directions.

2. The driver of claim 1, further comprising an abutment holder comprising:
   a) A mechanism for grasping an abutment; and
   b) A mechanism for attaching said holder to said latch head;

wherein said grasping mechanism firmly holds an abutment and prevents said abutment from rotating, and thereby preventing the transfer of torque forces from said abutment.

3. The driver of claim 1, wherein said pre-calibrated torque mechanism comprises two discs, two latches in grooves and a retaining spring ring, wherein said spring ring holds said discs together and sets, together with the shape of said grooves, a single pre-calibrated torque value, thereby preventing a prosthetic screw from being tightened with a force surpassing said pre-calibrated torque value, and wherein when said tightening force reaches said preset torque value of said pre-calibrated torque mechanism said latches overcome the force applied by said retaining spring ring thereby disengaging the two discs, and thereby causing a temporary separation of the shaft of said latch head from the shaft of said driver motor.

4. The driver of claim 1, wherein said electric motor is powered by batteries placed in a battery compartment and hence said driver is a cordless driver.

5. The driver of claim 1, wherein said electric motor is powered by external electric power.

6. The driver of claim 1, wherein said electric motor is powered by compressed air.

7. An abutment holder, to be used while attached to a latch head 1, wherein said holder comprising:

a) A mechanism for grasping an abutment; and

b) A mechanism for attaching said holder to said latch head;

wherein said grasping mechanism firmly holds an abutment and prevents said abutment from rotating, and thereby preventing the transfer of torque forces from said abutment.

8. The abutment holder of claims 2 and 7, wherein said abutment holder prevents the transfer of torque forces from said abutment to a coupled implant, when said abutment is being driven into said coupled implant or out of said coupled implant.

9. The abutment holder of claims 2 and 7, wherein said abutment holder, is either affixed to said latch head or detachable from said latch head.

10. The abutment holder of claims 2 and 7, wherein said abutment holder, enables a single hand practice with abutments and improves the access to the inner teeth implants.

11. The abutment holder of claims 2 and 7, wherein said attachment mechanism attaches to a handpiece as in claim 1, wherein said grasped abutment is held at an appropriate distance from the handpiece spinning mechanism, while said driver's tip drives said abutment screw.

12. A method for driving abutments on implants using a driver as in claim 1, the method comprising the steps of:

a) Placing the said driver tip onto said prosthetic screw of said abutment, while said abutment holder grabs said abutment positioned on a laboratory model.

b) Turning said driver motor backward while operatively attached to said abutment's screw and releasing said abutment from said model, as is.

c) Transferring said abutment to the patient's mouth maintaining respective position as in said model.

d) Turning said motor forward to attach said abutment to an implant in the patient's mouth, wherein when the turning torque reaches said preset torque value of said pre-calibrated torque mechanism, said pre-calibrated torque mechanism disengages the shaft of said latch head from the shaft of said driver motor.

13. The method of claim 12, wherein said pre-calibrated torque mechanism comprises two discs, two latches and a retaining spring ring , wherein said spring ring holds said discs together to reach a single pre-calibrated torque value for tightening prosthetic screws, and then, when said turning torque surpasses said pre-calibrated torque value, separating said shaft of said latch head from said shaft of said driver motor.

14. The method of claim 12, wherein said electric motor is powered by batteries placed in a battery compartment.

15. The method of claim 12, wherein said electric motor is powered by external electric power.

16. The method of claim 12, wherein said electric motor is powered by compressed air.

17. An organizing device designed comprising threaded holes to hold and release dental items selected from the group consisting of healing caps and healing abutments, using a driver as in claim 1, wherein said holes are arranged in a convenient order to shorten chair time and enabling a single hand technique.

18. The device of claim 17, further comprising cavities and compartments to house devices and parts selected from the group including the cordless driver of claim 1, abutment holders as in claims 7, other hand drivers, abutments, screws, spare driver tips, etc.

19. A method of using an organizing device as in claim 17 and the driver as in claim 1, the method comprising the steps of:

a) Loading each healing cap orderly from corresponding implants using the handpiece latch driver of claims 1 by operating the motor of the driver for a short time backward and unloading each of said loaded healing caps to a threaded hole in said organizing device by operating the motor of the driver for a short time forward; and

b) Taking an abutment from said laboratory model and attaching said abutment onto a designated vacant implant, using said latch head driver having said abutment holder attached to said driver.

20. The method of claims 19, further comprising the step of taking each abutment from corresponding implant and putting said abutment back onto said laboratory model, using said driver with said abutment holder.

21. The method of claims 19 or 20, further comprising the step of detaching said abutment holder into said organizer, applying pressure two fingers from the same hand on said holder's bottom, thereby performing a single hand operation, and transferring said healing caps back from said organizer by operating the motor for a short time backward onto designated vacant implants by operating the motor forward and then pull said driver up.

22. The driver of claim 1, wherein said driver is used for endodontic applications or for implantology.

23. The driver of claim 1, wherein a straight nose cone is used instead of a latch head.

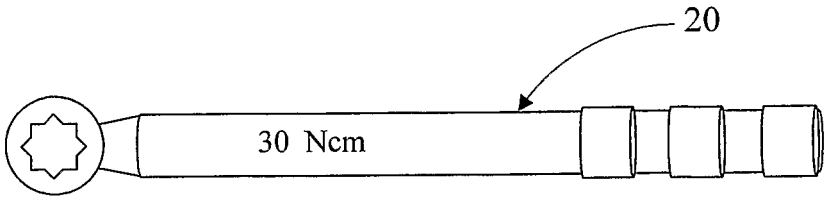


Fig. 1

PRIOR ART

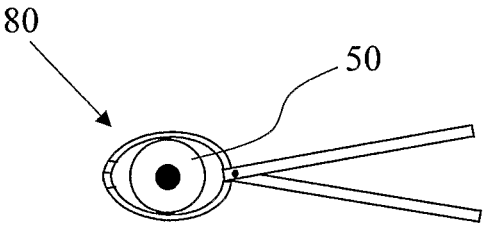


Fig. 2

PRIOR ART

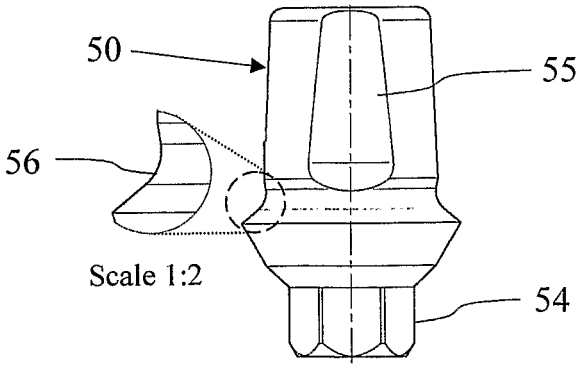


Fig. 3

PRIOR ART

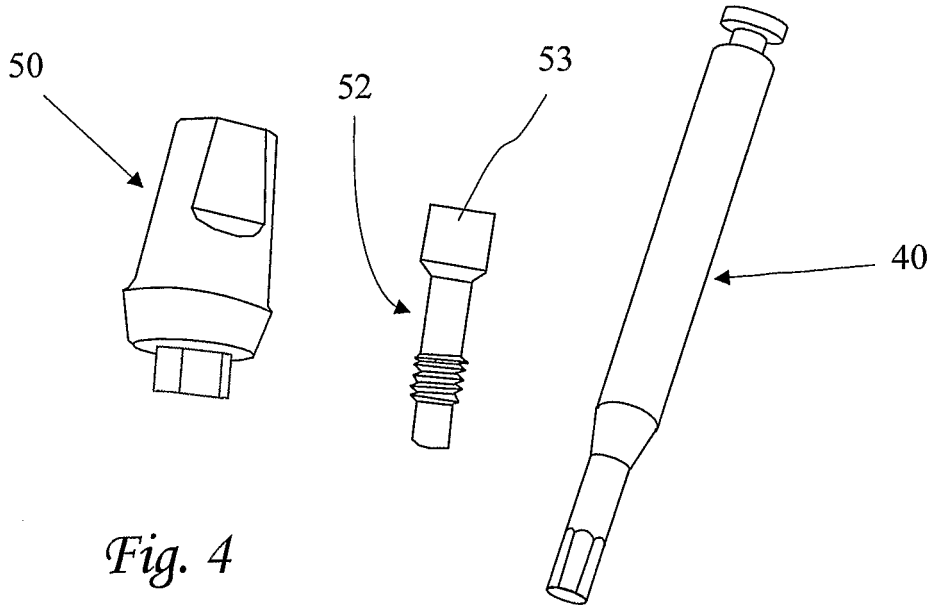


Fig. 4

PRIOR ART

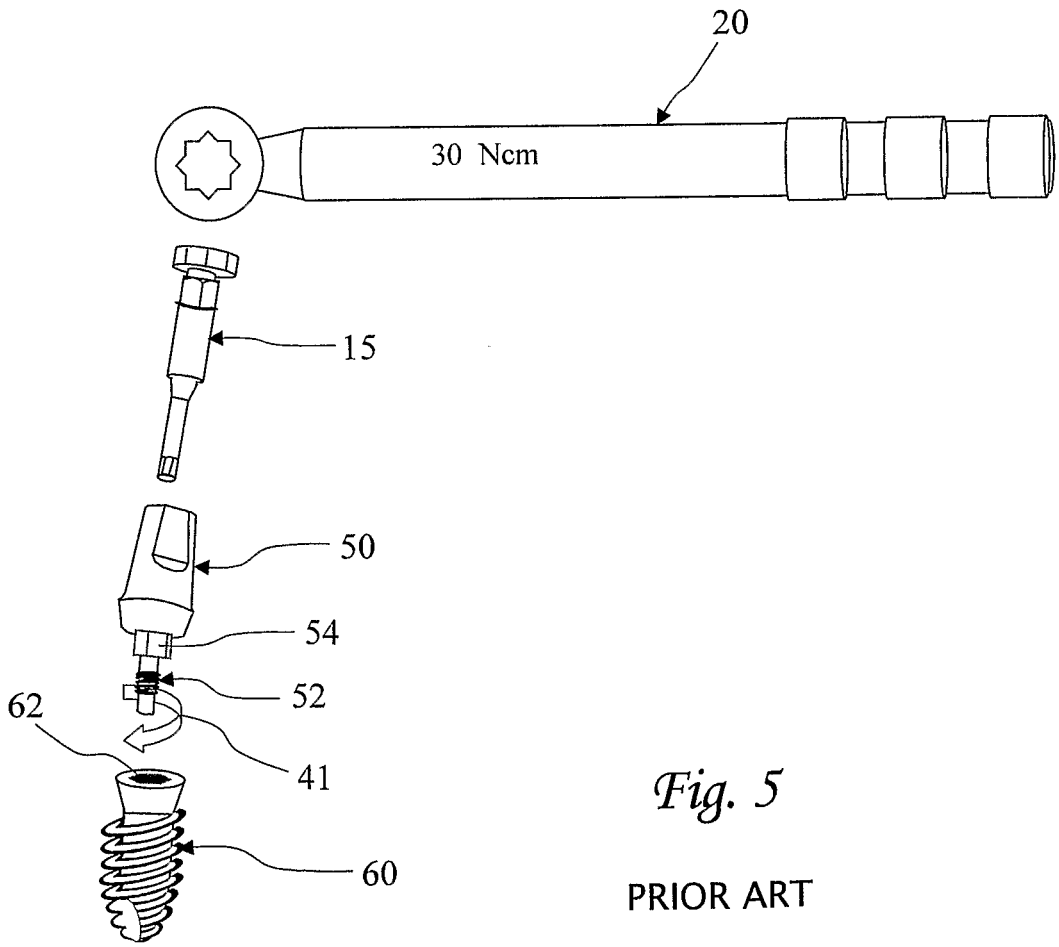


Fig. 5

PRIOR ART

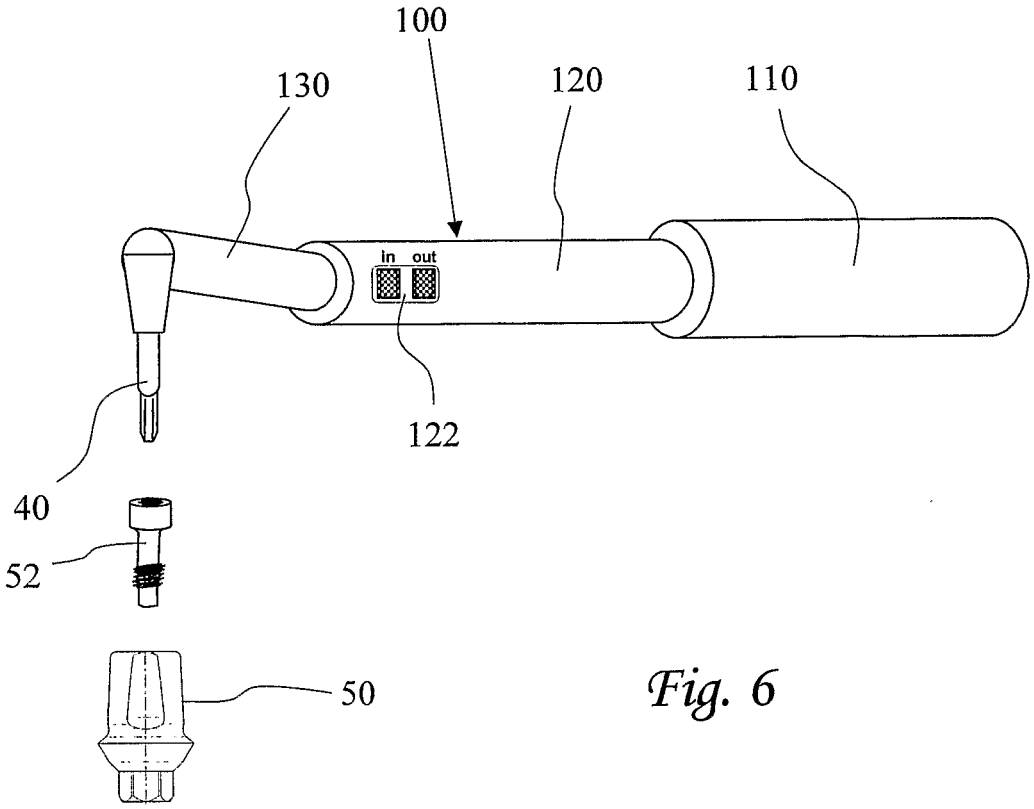


Fig. 6

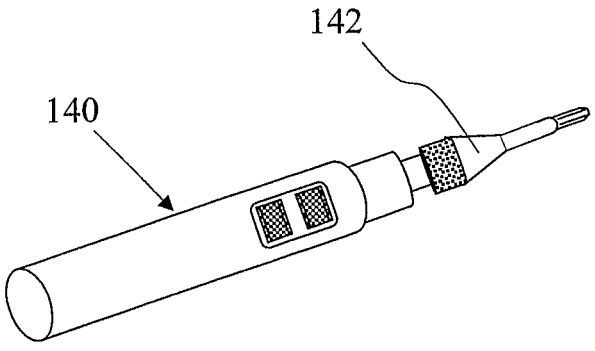


Fig. 7

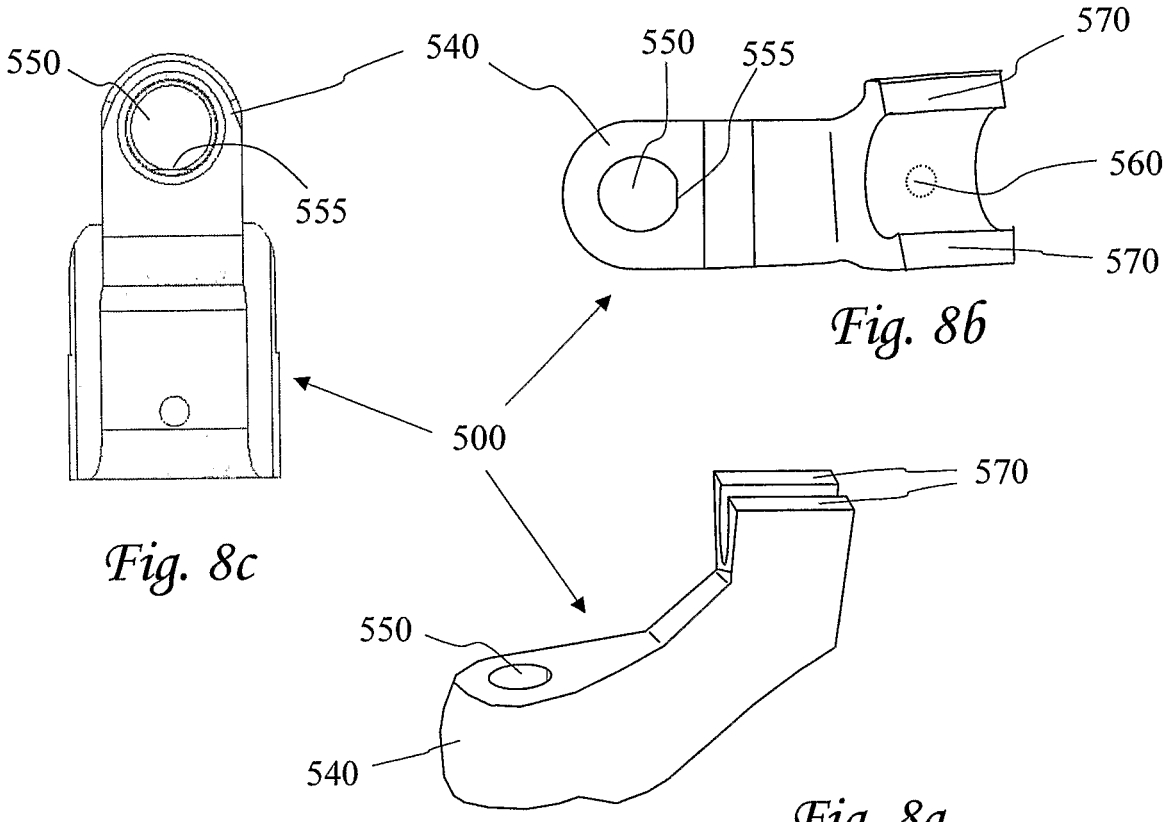


Fig. 8c

Fig. 8b

Fig. 8a

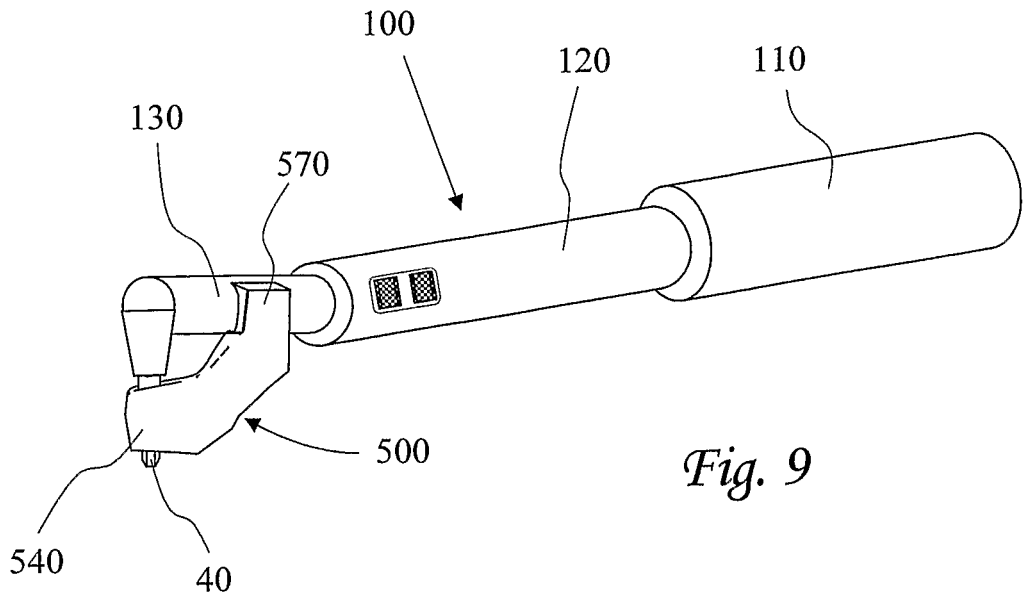


Fig. 9

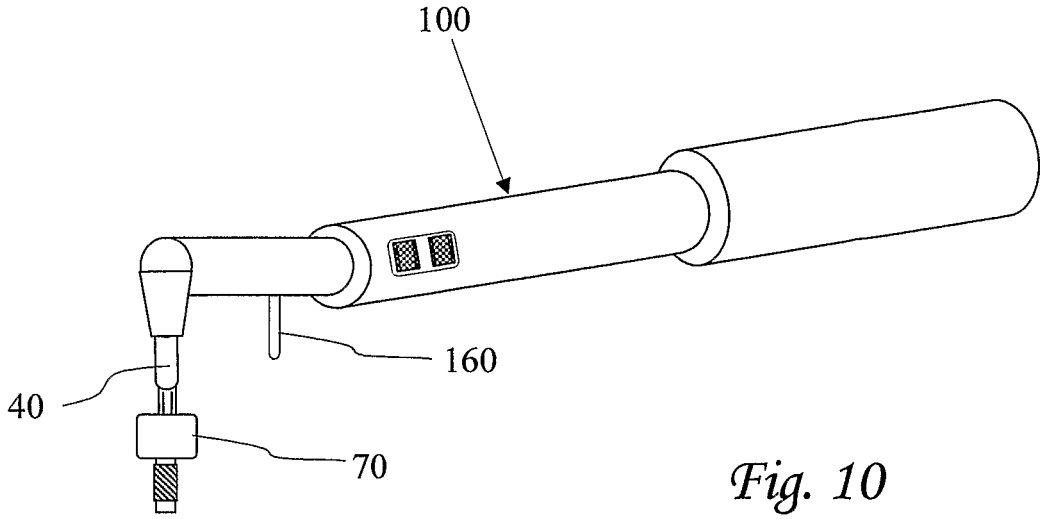


Fig. 10

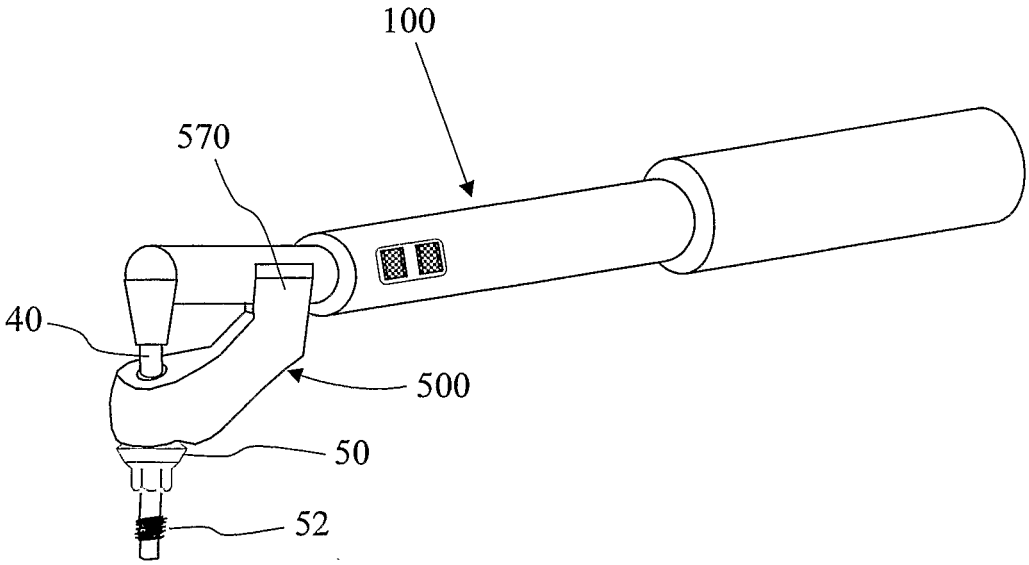


Fig. 11

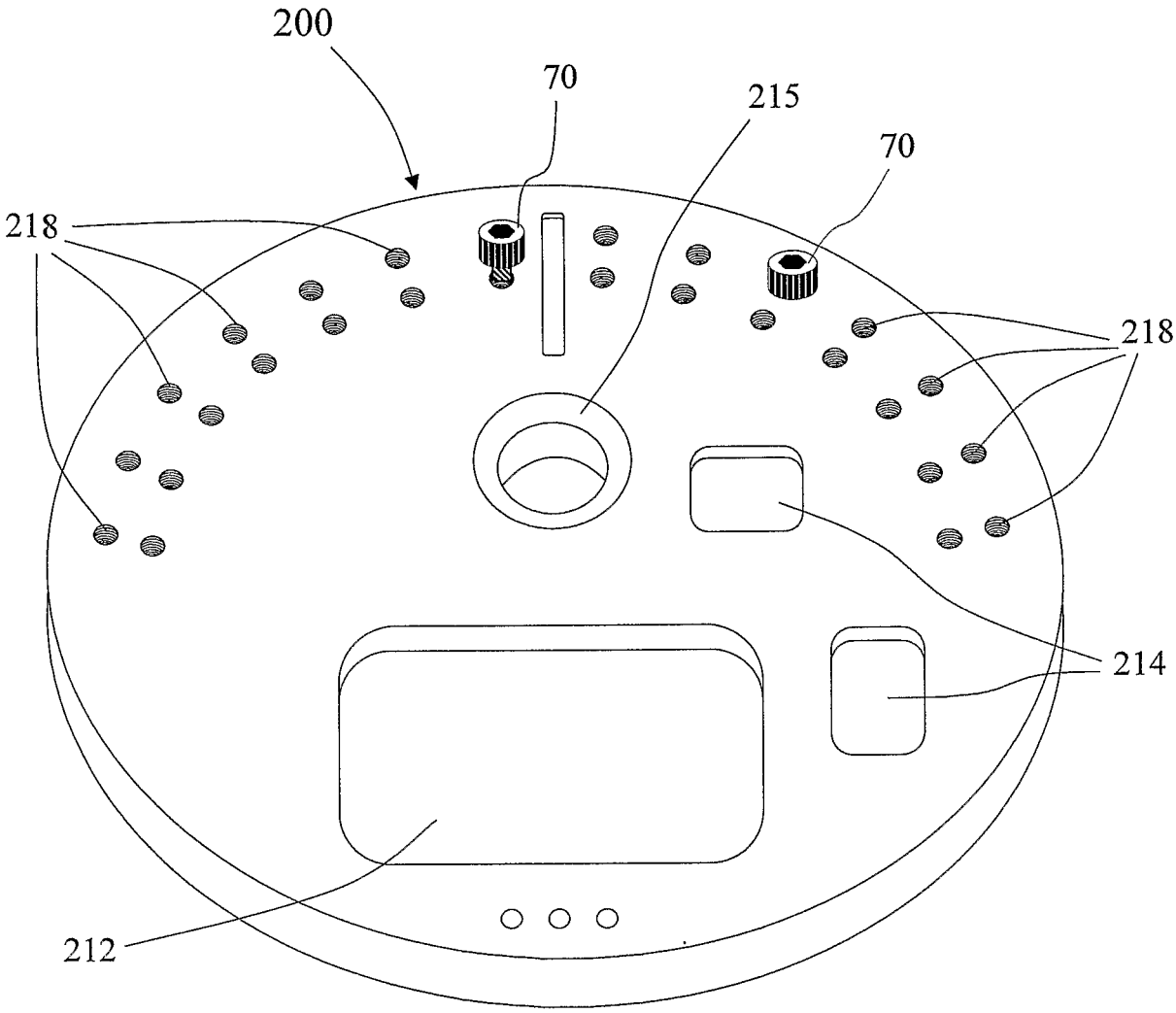
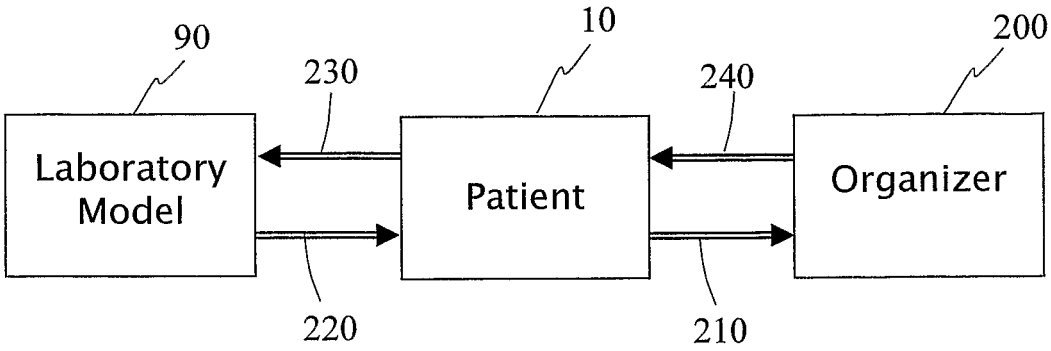


Fig. 12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230
10
240
200
Laboratory Model
Patient
Organizer
220
210

Fig. 13

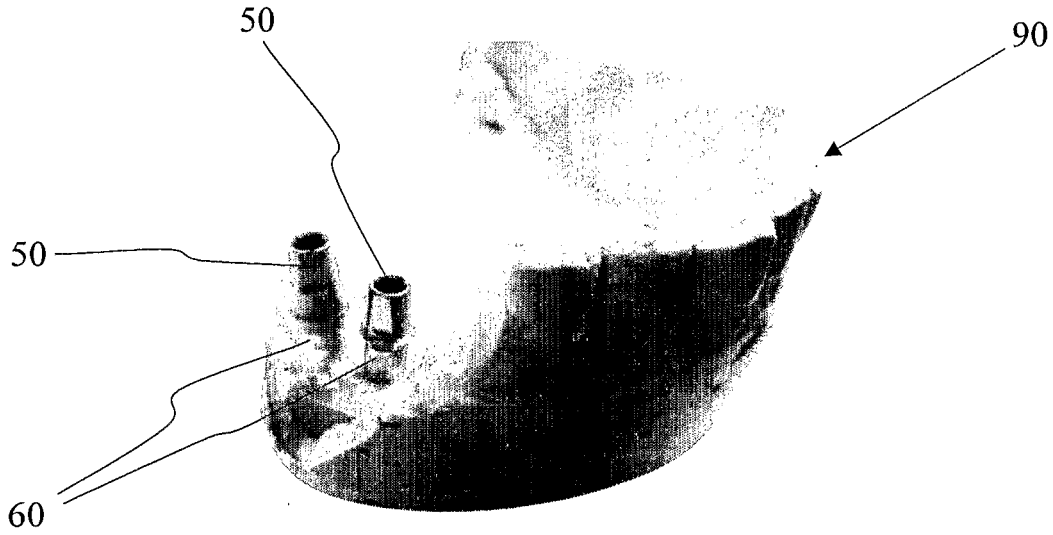
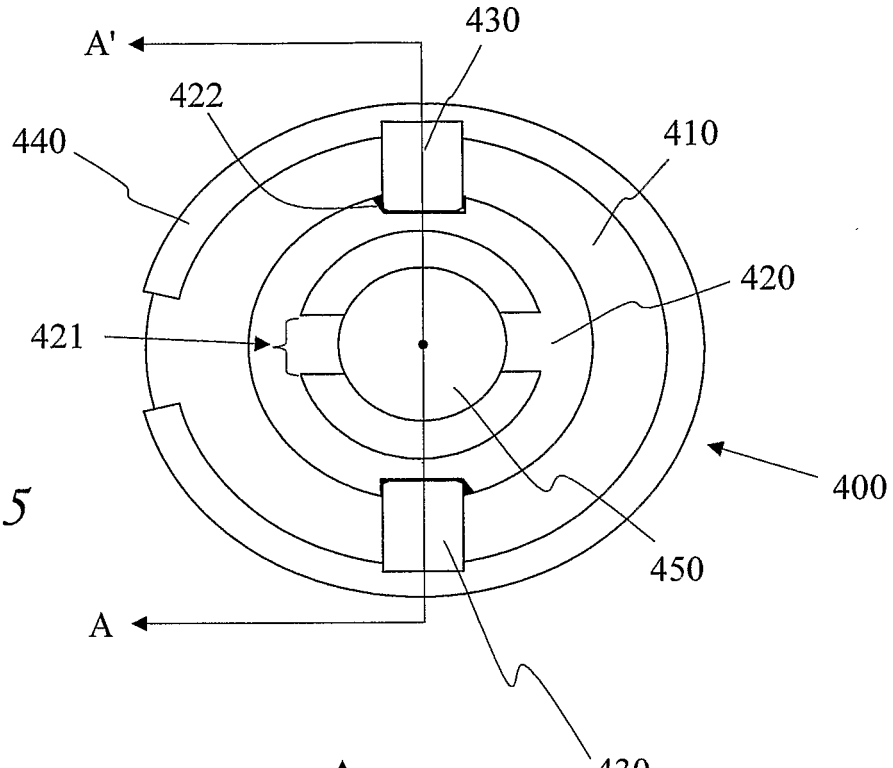

50
90
50
60

Fig. 14


A'
430
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410
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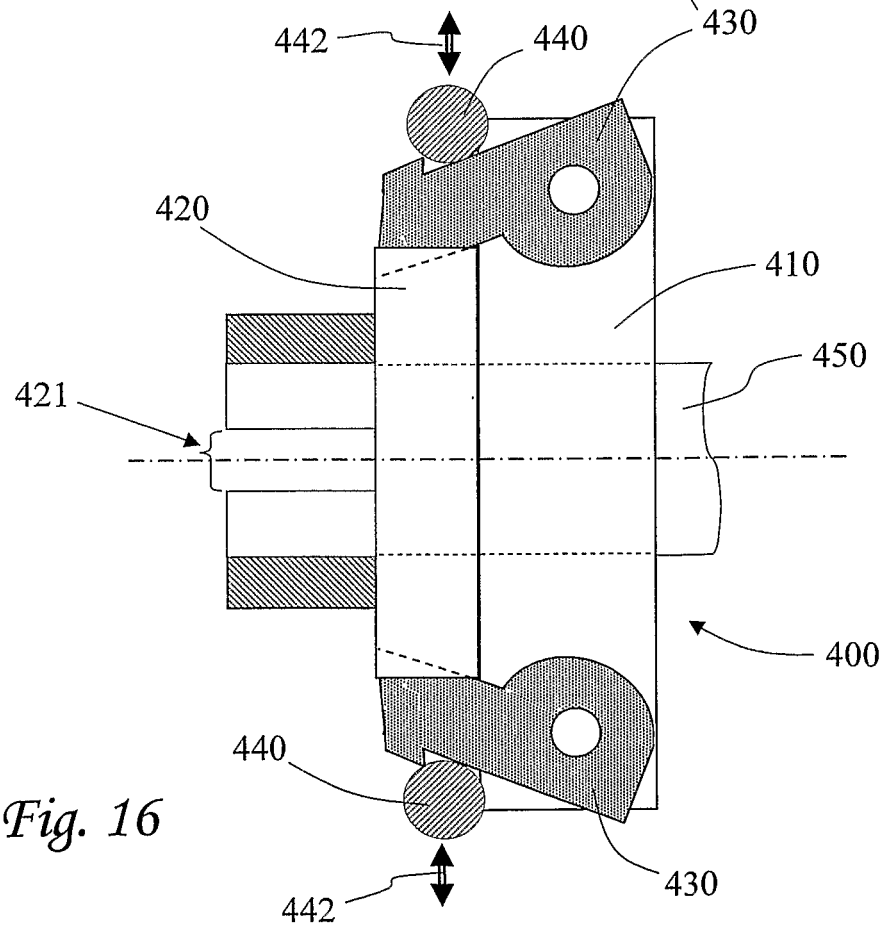
421
400
450
A

Fig. 15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421
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430
442

Fig. 16

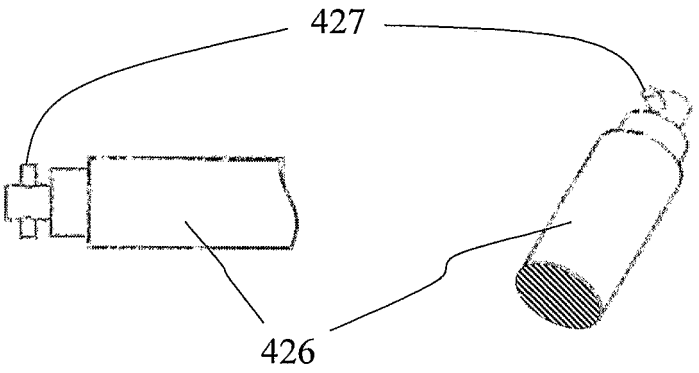

Fig. 17