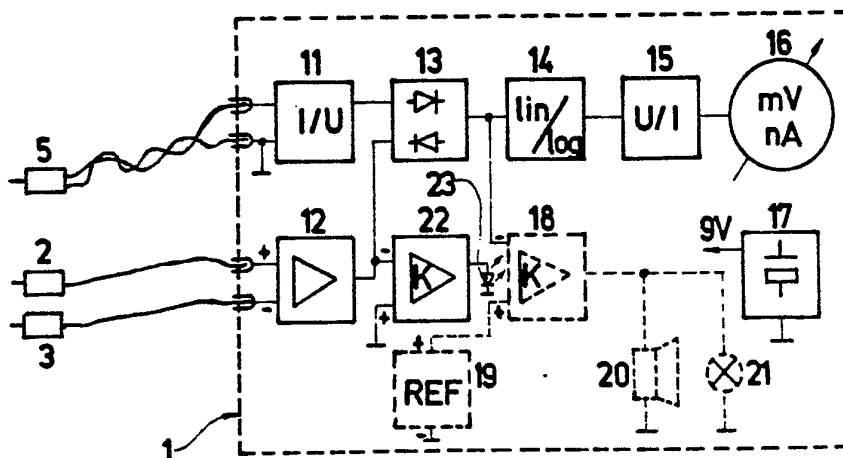




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(21) International Application Number: PCT/HU86/00025 (22) International Filing Date: 4 May 1986 (04.05.86) (31) Priority Application Number: 1677/85 (32) Priority Date: 2 May 1985 (02.05.85) (33) Priority Country: HU (71)(72) Applicants and Inventors: BAY, Zoltán [HU/HU]; Bacsó Béla u. 38, H-1084 Budapest (HU). VUKÁN, György [HU/HU]; Határőr u. 19/b, H-1122 Budapest (HU). LAKATOSNÉ VARSÁNYI, Magda [HU/HU]; Mese köz 8, H-1121 Budapest (HU). VASS, Zoltán [HU/HU]; Bartók Béla ut 7, H-1114 Budapest (HU). SZIRÁKI, Laura [HU/HU]; Törökugrató u. 24, H-1118 Budapest (HU). KISS, László [HU/HU]; Ujvidéki u. 4, H-1145 Budapest (HU).		(74) Agent: PATENTBUREAU DANUBIA; P.O. Box 198, H-1368 Budapest (HU). (81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent), FR (European patent), GB (European patent), IT (European patent), JP, LU (European patent), NL (European patent), SE (European patent), US. Published <i>With international search report.</i>
(54) Title: PROCESS AND EQUIPMENT FOR EXAMINATION ELECTRO-CHEMICAL EFFECTS OF METAL REPLACEMENTS (IMPLANTATIONS) IN LIVING ORGANISM (57) Abstract A process and an equipment are used for examination of electro-chemical effects inducing inflammation and allergic symptoms in the living organism, which are induced by two or more metal replacements respectively by other, in the living organism implanted metal (implantation). During the procedure according to the invention at patients with inflammatory and/or allergic symptoms it is controlled by <i>in vivo</i> current-measuring near the approachable metal replacements (implantations), if the ion current - which is established on the effect of galvanic cell has been created by metal replacements - reaches the allergic symptoms or the critical value inducing inflammation, further on the values of electrode potentials measured on the implantations are compared to the anode-polarization curves given to the metal replacement alloys, and on the basis of it the conclusion is drawn on the measure of ion current developed between certain metal replacement pairs. The equipment according to the invention consists of an electronic unit (1) and probe (2, 3, 5) used for measuring current resp. electrode potential. In the electronic unit there is a current-voltage converter (11) sensing current to be measured, an instrumental amplifier (12) sensing voltage to be measured, a precision rectifier (13) connected by its input with the output of formers, and on the output of it a suitably logarithmic amplifier (14) is connected, and on the amplifier a voltage-current converter is connected, which drives a suitably analogous indicator, especially Deprez-instrument (16). For the sake of the simpler handling, the equipment can be supplied with sound and/or light-source, which give signal for the doctor in case of overflowing a given value (voltage or current) about the presence of pathological ion-migration.		



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PROCESS AND EQUIPMENT FOR EXAMINATION ELECTRO-CHEMICAL
EFFECTS OF METAL REPLACEMENTS (IMPLANTATIONS) IN LIVING
ORGANISM

The invention relates to examination electro-chemical
effects of two or more metal replacements in living organism,
5 and equipment to implement the process, which contains an
electronic unit and electrode potential measuring probes.

Background of the invention

It is known, that in the last 15 to 20 years, as a
result of the rise in price of dental noble metal alloys,
10 there is a growing demand on production and use of common
metal alloys suitable for dental use, even in the richest
countries. First of all the number of nickel-base metal
alloys is high (Ni content is: 60 to 75 %), which also
contain chrome and cobalt in a rather big percentage. According
15 to the relevant literature e.g.: H.W. Gundlach: "Edelmetall-
-Dentallegierungen: Edelmetallfreie-Dentallegierungen"
(Dental-Labor 30,321 /1982/, Sonderdruck), or D. Hermann:
"Allergische Reaktionen durch zahnärztliche Werkstoffe",
(ZM Fortbildung 18/1981), manifestations of allergy can be
20 shown in connection with all the three metals. The presumable
cause of this, that the a.m. metal alloys in the mouth or
in other part of the body (e.g. in case of pacemaker in the
chest) may form galvanic cells together with metal alloys
set in or metal alloys to be set in (amalgam filling, metal
25 crown, bridge, metal plate). That means, that metal ions can
be dissolved from the metal alloys on the advantageous
temperature of the mouth and pH towards the living tissues.
In this temperature (35°C) the dissolved metal ions can
very easily join to protein bodies, and as a result of it,
30 allergic reactions can be appeared in the organism, which
were previously senzibilized by metal (e.g. local and
distant mucous membrane- and skinreactions, for example:



- 2 -

eczema, dermatitis, dermatosis, etc.). This reaction remains till the factor, which caused allergy (for example: prosthesis made of dental metal alloy) will not be removed. The methods known and used up till now for clearing up metal

5 replacements which induce allergic focus, are based on in vivo measuring potential difference among metal replacements already set in, respectively before setting in new replacements, the expectable ion migration will be determined in vitro well in advance by complicated laboratory procedure

10 so, that the metal replacements, as electrodes, will be placed into electrolyte mimitating tissue fluid, or often into saliva taken from the mouth of the patient. After all neither the voltage measured in vivo in the mouth, nor ion current values can be measured in vitro mean

15 substantial information for the diagnosing dentist. In the publication was written in the beginning of 1983 "Noble metal alloys. Common metal alloys." Dr. Gundlach (Bego) deals intensively and first with the electro-chemical symptoms occurred in connection with dental metal alloys

20 in vitro circumstances. In his study he points out, that each metal alloy passes its ions only over a certain electrode potential limit characteristic thereof, up to this potential limit it is protected from this by an oxide layer, which passivates it.

25 In accordance with this the so called anode-polarization curve can be ^{measured} / , which is characteristic for each metal and it can be punctually determined from it, up to which electrode potential is there so called passive ^{current} / (when there is no any ^{current}) and from which electrode potential is

30 there again active ^{current} / . It is demonstrated by Gundlach's figure. (Fig.4.).

- 3 -

As a consequence of the passive ^{current} / period, respectively of the non-linearity of electrode potential curve, not every potential difference induces ion current producing allergic symptoms, so from the voltage measured in mouth
5 among metal replacements we can not drive to the conclusion unanimously of ion migration.

The disadvantage of in vitro measurement of ion migration is, that the body-electrolyte of the patient can not be substituted only by saliva and besides this, only
10 the early period of development of galvanic cell can be examined by this kind of systems, when the oxide layer on the electrodes (metal replacements) prevents formation of ion current which later can be dangerous.

The invention is aimed at insuring a process, by the
15 use of it the reasons- inducing allergic symptoms of senzibilated patients - can be diagnosticated by measuring the electrode-potential of prothesis, respectively the metal replacements responsible for injurious ion migration can be determined, and the patient can be cured by the removal of it.

The invention is also aimed to prognosticate - by the
20 application of the process and by measurement of electrode-potential-the expectable effect of a given alloy of metal replacement after setting in, respectively by the use of this it can be easily selected the alloy, which will have probably
25 no any injurious electro-chemical effect to the living organism.

Further on, the invention is aimed to insure a process and an instrument, by the help thereof ion migrations, which induce allergic symptoms, and are characteristic to the rate of corrosion, can be simply and reliably in vivo cleared
30 up.

- 4 -

The invention is also aimed to insure an instrument, which is able to measure and indicate not only in vitro, but first of all in vivo the undesirable ion migration in the examined persons in certain circumstances, and it is
5 suitable to decide that the metal replacements set in are in active or passive state in respect of allergy.

The base of the invention is the recognition, that the in vivo electro^{de}/potential measurements can be extended to prognostic aims, if the measured values will be compared
10 with the electro-chemical properties of the metal alloys already implanted, or to be implanted, or metal alloys come into question in this purpose.

Brief description of the invention

15 The substance of the invention on this recognition is, that at patients with inflammatory and/or allergic symptoms, we controll by in vivo current measurement in the nearby of the approachable implantations, that the ion current, which developes under the influence of galvanic cell established
20 by metal replacements - teaches the critical value, which occures allergic symptoms or inflammation.

In case of local complaints, for example: oral mucous membrane inflammation, the measurement of ion current gives enough help to determine the allergen; while in case of
25 distant, allergic complains it is advantageous to complete the current measuring with dermatological specific test. By the help of the test it can be exactly determined, which metal component in the alloy of metal replacement is responsible for the development of allergy.

30 The above written steps of the process can be applied advantageously in the course of diagnostical examinations,

- 5 -

that means, in cases, when metal replacements are in the organism for a long time, and the medical attendant must establish, that the metal replacements are responsible for inducing inflammation and/or allergic symptoms, and
5 if they are, then which of the metal replacements, respectively which component of its alloys is allergen, namely the material, for which the organism of the patient sensitive is.

The "in vivo" measured electrode potential values of metal replacements will be compared according to the
10 invention with the anode-polarization curves given for the alloys of metal replacements and on the basis of it we can conclude to the rate of corrosion of metal replacements. The expectable electrode potentials of the new metal replacements to be set in compared with the metal replacement(s)
15 already set in will be "in vivo" measured - according to the invention - by touching the recipient tissue to the specimen, made of the same material as the a.m. new metal replacement, and we compare the result of the electrode potential value measurings with the anode-polarization curve of the new
20 alloy, and predict the measure of the expectable ion current after the implantation.

Utilization of specimen can be applied advantageously at prognostical examinations, in cases, when the medical attendant has to decide, that the metal replacement to be
25 inplanteted will be in active or passive state in the organism of the examined patient, resp. he has to select the metal replacement from those ones, come into question, which stays passiv implantated in the organism of the patient, that means, it doesn't induce allergic symptoms
30 or ion migration inducing inflammation under electrode-potential circumstances.

- 6 -

In accordance with this fact, the instrument, which is suitable to execute the process, is supplied with a specially developed probe which is good for measuring voltage and current, and connected by cable to the electronic unit, and is also supplied with a set of specimen made of the material of metal-replacement. Further on the most general construction of the electronic unit consists of: current-voltage converter, which receives the current to be measured, an instrumental amplifier, which senses the voltage to be measured, precision rectifier, which connects with its inputs to the outputs of the before mentioned two circuits, in given cases a logarithmic amplifier connected to the outputs of the before mentioned precision rectifier, voltage-current converter, which follows the logarithmic amplifier, and a Deprez-instrument, which is advantageously analogous and is driven by the converter.

The construction of the equipment according to the invention proved to be advantageous, by which one of the inputs of the comparator - driving a sound detector and/or flash signal appliance - is connected to the output of the logarithmical amplifier of the electronic unit. The other input of the comparator is joined to another voltage source.

Another construction of the probe used for measuring electrode-potential proved especially advantageous, and consists of a hollow insulator shaft, a cup which can be hermetically locked on the top, a hygroscopic material, which can be put in the open bottom of the shaft, an electrolyte inside the shaft, suitably synthetic saliva, silver- and silverchlorid/reference electrode of the second kind immersed in the electrolyte, and it is linked by a metal thread with one of the inputs of the instrumental amplifier of the electronic unit.

- 7 -

A feeler probe ending in a metal peak (suitably made of Cr-Ni steel) and supplied with an insulating handle, proved advantageous, and it is linked by a metal thread with the other input of the instrumental amplifier of the electronic unit.

Certain specimen of the set of specimen made of available materials of the metal replacements seat on the measuring peak of the feeler probe and can be plugged in.

Another construction of the ion current measuring probe is also advantageous, where on the end of the measuring peaks of the probe, platinum hemispheres are fastened, which are linked by a metal thread leading through the measuring peaks with the current-voltage converter of the electronic unit.

Brief description of the drawings

Further on we represent the invention in details on the bases of a constructing pattern with the use of the enclosed drawing, where

- Fig.1. block-schema of the equipment according to the invention
- Fig.2. drawing of the reference probe used for measuring electrode-potential
- Fig.3. drawing of feeler-probe used for measuring electrode potential
- Fig.4. an anode-polarization curve given for alloy of metal replacement
- Fig.5. drawing of the probe used for measuring ion current
- Fig.6. specimen.

The diagnostical examination of a patient with local complains (inflammation), is the following according to the invention:

Brief description of the preferred embodiments

- The current measuring probe can be used in the surrounding of the questionable metal replacement, suitably on the gums (gingiva propria). As only a small part of the
5. tissue, which forms the current way, is touched by the probe at the same time, the electronic unit will indicate not the whole ion current which flows among the activ metal replacements, forming the galvanic cells, but only a small percentage of it.
- 10 According to clinical experiences this is already enought to establish the diagnosis, because the partial current driven by the probe to the electronic unit is proportionate to the total ion current, in every case.
- As a result of examination and measuring on a great number
- 15 of patients, the ion currents under 30nA can be regarded normal, while ion currents over 50nA are regarded pathological, in every case.
- Measuring in the mouth on the mucous membrane we must take good care to measure ion current on that part of the
- 20 nucous membrane, where the bio currents, which occure in the mucous membrane can be moved or they move on the effect of muscle movement, can not influence the result of measurement. That kind of place is for example the gingiva propria.
- The proper place of gingiva propria and the electrodes
- 25 on the end of measuring peak must be dried by air before measurement.
- In case of local complains (inflammation, gingivitis) additional dermatological test is not needed, the patient can be cured by the removal of activ metal replacements,
- 30 which are responsible for inflammation, resp. by the implantation of metal replacement made of satisfactory material.

- 9 -

In case of examination of patients with allergic (distant) complains the above mentioned cure can be completed with dermatological specific allergology test (cutan-test), and as a result of it, it can be told, which metal component of the alloy is responsible for establishment of allergy.

By writing the pathogenic allergen metal on to the case-sheet those alloys can be eliminated in the future, which contain allergen metal.

In case of therapy treatment, we eliminate the metal replacement alloys containing allergen metals from the assortment come into question during the implantation. When this kind of allergen doesn't occur from the case-sheet, we look for them by in vivo ion current measurement, according to the invention, respectively in certain cases by dermatological test.

After the removal of the anodically dissolving member of metal replacement-couple, which has been found very active by ion current measuring, we choose a specimen made of similar material in respect of electrodepotential to that part of replacement-couple, which stays in the mouth, then we plug it in the measuring peak of the feeler probe, and we touch it to the mucous membrane on the place of the new metal replacement.

At the same time we measure the electrode potential of metal replacement to reference referring electrode, so that we touch the end of electrodepotential measuring probe to gums and the feeler probe to the previously air-dried metal replacement, respectively. We repeat voltage measuring several times rotating the metal replacements to be implantated.

- 10 -

We choose advantageously the gingiva propria on the mucous membrane and we dry the specimen by air before measuring.

5 The result of electrode potential will be compared with anode-polarization curve given to the chosen specimen and alloy of fix metal replacement (if there is any), and on the basis of it we draw the conclusion on the measure of ion current can be expected after implantation.

10 If the measured potential happenly gets on the activ part of the anode-polarization curve, than the chosen alloy must be eliminated from the sortiment of alloys of metal replacement of implantation come into question.

We must choose that metal alloy from the other ones, to be implantated, which changes the voltage-terms of the
15 organism the least, and doesn't lead to ion precipitation inducing allergy, that means it stays passive after implantation in the organism.

The block-scheme of the equipment used for execution of the process according to the above written invention is
20 shown in Fig.1. The part surrounded by ragged line is the electronic unit, which is built in an instrument box. A specially constructed probe, which is used for voltage measuring can be connected to this electronic unit (Fig.5.), and a reference potential securing probe, which is used
25 for measuring electrode potential (Fig.2.), and a feeler probe (Fig.3.).

A set of specimen belongs also to the equipment, each part of it is constructed according to Fig.6., but each of them is made of different kind of metal replacement materials.
30 The reference probe 2 and feeler probe 3 are used for measuring electrode potential.

- 11 -

The reference probe 2 consists of a hollow insulating shaft 29, a cup, which can be hermetically locked on the top 30, a hygroscopic material, which can be put into the open bottom of the shaft 24, cotton-wool as an example, as electrolyte inside the shaft 25, suitably synthetic saliva, a silver- and silverchlorid/^{reference}electrode of the second kind ^{immersing} 7 in the electrolyte 28, which are linked by a metal thread 26 outside the shaft and a plug 27 with one of the inputs of the instrumental amplifier 12 of electronic unit 1.

The feeler electrode 3 is a probe, ending in a metal peak 32 which is supplied with insulating shaft 31, it is linked by a metal thread 33 through a plug 34 with the other input of the instrumental amplifier 12 of the electronic unit 1.

The current measuring probe 5 consists of an insulating shaft 51, 2 pieces of platinum feeler situating near each other on one end of the shaft and ending in platinum sphere 52, which are connected by a metal thread 53 through plugs 54 with the current-voltage converter 11 of the electronic unit 1.

The current-voltage converter 11 in the electronic unit and an output of the instrumental amplifier 12 sensing voltage to be measured are connected to the input of the precision rectifier 13, on the output thereof is a thermocompensated logarithmic amplifier 14, connected, and on the output of this a voltage-current converter 15 is connected, which drives an analogous indicator, suitably a Deprez-instrument 16.

On the output of the logarithmical amplifier 14 is connected one of the inputs of the comparator, which drives a sound detector and a flash signal appliance, and on the other input thereof a reference voltage source is connected.

- 12 -

The metal feeler peak 32 of the feeler probe 3 is constructed so, that the suitably constructed specimen 6 can be slid on it, which metallic contacts with the metal feeler peak 32.

- 5 The supply of the instrument is secured by a voltage source of 9V 17, but it can be operated from the network with proper mains adapter.

After switching on the supply voltage, the instrument is in good working condition. Current measuring is possible
10 by the current measuring probe, / ^{electrode potential} measuring is possible by the reference and feeler probe. During measurement we measure either voltage, or current.

The voltage arriving on the input of the instrument is sensed by the instrumental amplifier 12, current will be
15 transformed also to voltage, by current-voltage converter 11. This voltage gets to the input of the precision rectifier 13, the task of it is to secure the polarity-independent measurement.

The polarity of voltage-measurement is indicated by LED 23,
20 with the help of comparator 22.

The rectified voltage gets to the voltage-current converter 15 which drives the indicator, through the logarithmical amplifier 14.

The logarithmical amplifier 14 secures the current to be
25 measured, respectively, it secures the measurement of voltage in one measuring range.

Hereby it becomes unnecessary the complicated manual, or automatical change of measuring range which is more complicated circuitly.

- 30 The Deprez-instrument 16 can be read more easily by the dentist, namely it is more important to sense the changing during measurement, than the punctual indication of voltage- and current values.

- 13 -

By setting in the reference voltage-source connected to the input of the comparator 18 a value can be set in, that in case of overflowing it, the dentist will be warned by a sound detector and flash signal appliance
5 connected to the output of the comparator.
Especially the sound signal means a great help for the diagnosticating doctor, because he can pay his attention to the placing of the probe.

We can summerize the advantageous effects of the
10 application of instrument and process according to present invention as follows:

By present process ion-migrations, inducing allergic symptoms can be cleared up in vivo, in contradiction with processes known up-till-now, metal replacements which
15 induce ion-migrations, respectively the metal component in their metal alloys which is responsible for allergy.

By changing of the very active metal replacement, the patient can be cured in a very short time, and by eliminating the allergen metal component, the metal-replacement-alloys
20 inducing allergy can be also eliminated in the future.

The equipment according to present invention is considerably orientated to the task, that means, it suits to the requirements of special medical tasks. It can be simply handled, it doesn't need switch either in measurement
25 limit, or in working mode.

The special advantage of the equipment with sound singing is, that the dentist is not obliged to share his attention while using it, but he must concentrate only on the right placing of the probe.
30

Claims

1. Process for examination electro-chemical effects inducing inflammation and allergic symptoms in living organism, which are induced by implantation made of two or more metals in the living organism, during the process the electrode-potentials of implantated metal replacements are measured, characterized in that we compare the measured electrode-potential values with the anode-polarization curves given to the alloys of metal replacements and on the basis of it we can conclude to the rate of corrosion of certain metal replacements.
2. Process as claimed in Claim 1, characterized in that beside electrode-potential measurement we measure "in vivo" also ion currents, has been induced by potential difference.
3. Process as claimed in Claims 1. or 2. characterized in that we measure "in vivo" electrode potentials among metal replacements, which get into electro-chemical interaction with each other or with metal implantations to be implantated and/or already implantated, in that way, that we touch specimen made of the same material as of the metal replacements to be implantated, to the receiving tissue, and we measure the electrode-potential on the specimen touched to the tissue, or on another similar specimen, or on an implantated metal replacement.
4. Equipment, especially used for the execution as claimed in Claims 1 to 3, which consists of an electronic unit and probes, characterized in, that it is specially constructed, it is suitable for measuring electrode-potential and current, it is connected by lead in the electronic unit, it is supplied with probes (2,3,5), in the electronic unit 1 there are: a current-voltage converter 11 sensing the current to be measured, an instrumental amplifier 12 sensing the voltage

- 15 -

to be measured, a precision rectifier 13, connected by its input with the output of the before mentioned parts, in given cases, a logarithmic amplifier 14 is connected on the output of the precision rectifier 13, on the latter one, suitably an analogous indicator, a voltage-current converter 15 is connected, which drives especially Deprez-instrument 16.

5 5. Equipment as claimed in Claim 4. characterized in that on the output of the suitably logarithmic amplifier 14
10 in the electronic unit 1 is connected with one of the inputs of comparator 18 which drives a sound detector 20 and/or a flash signal 21, while the other input of the comparator 18 is connected with a reference voltage source. 19.

15 6. Equipment as claimed in Claims 4. or 5. characterized in that the reference probe 2 used for measuring electrode-potential, which consists of a hollow insulating shaft 29, a cup hermetically locked on the top 30, a hygroscopic material, which can be put in the open bottom of the shaft 24, an electrolyte inside the shaft 25, suitably synthetic saliva,
20 ^{reference} / electrode of second kind ^{immersing} / into electrolyte, especially silver-silverchloride 28, and together with the feeler probe 3 it is connected by metal thread with the electronic unit 1.

25 7. Equipment as claimed in Claim 6. characterized in that platinum hemispheres 52 are fastened to the end of measuring peak of the current-measuring probe, and they are connected by a metal thread 53 with the electronic unit 1.

8. Equipment as claimed in any of Claims 4 to 7 characterized in that it is equipped with a set of specimen 6 made of available materials of metal replacements.

30 9. Equipment as claimed in Claim 7. characterized in that the specimen 6 seat on the measuring peak 32 of the feeler probe 3 and it can be plugged in.

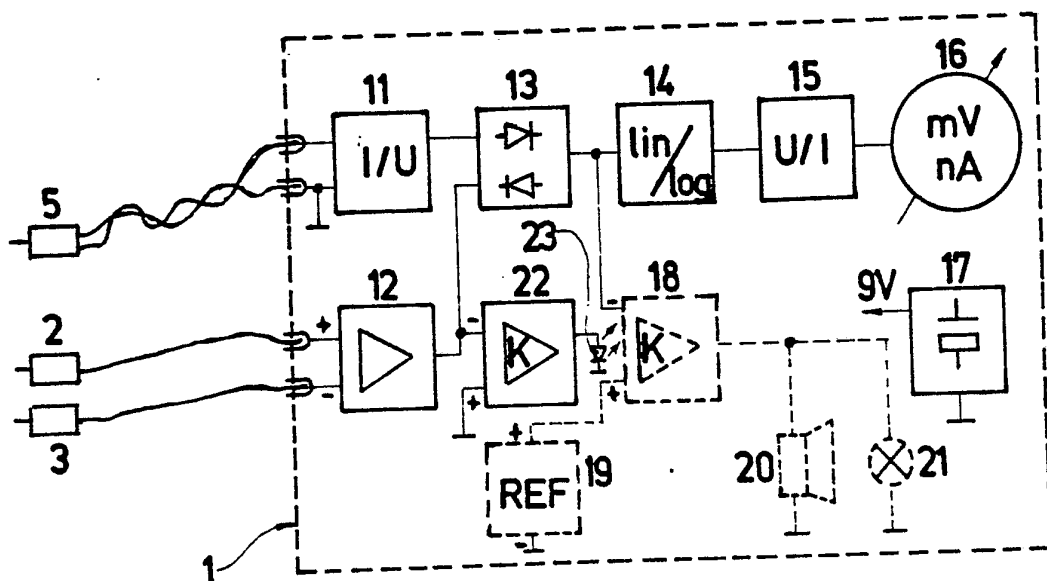


Fig 1

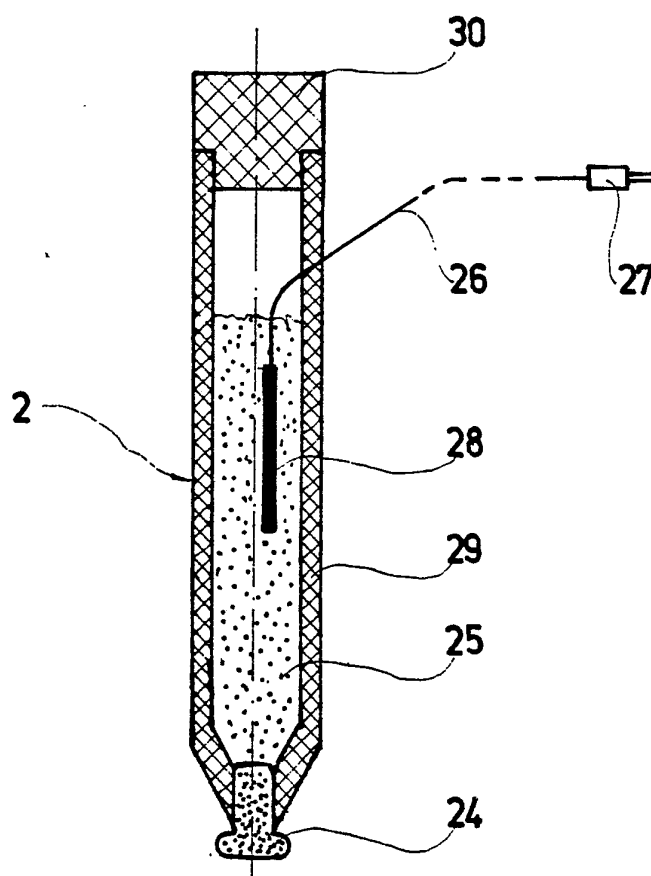


Fig 2

2 / 3

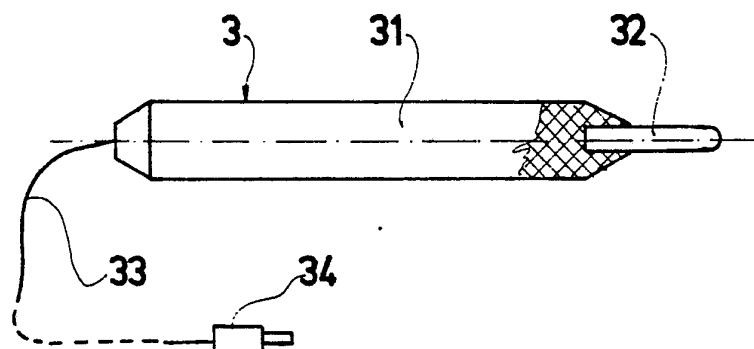


Fig 3

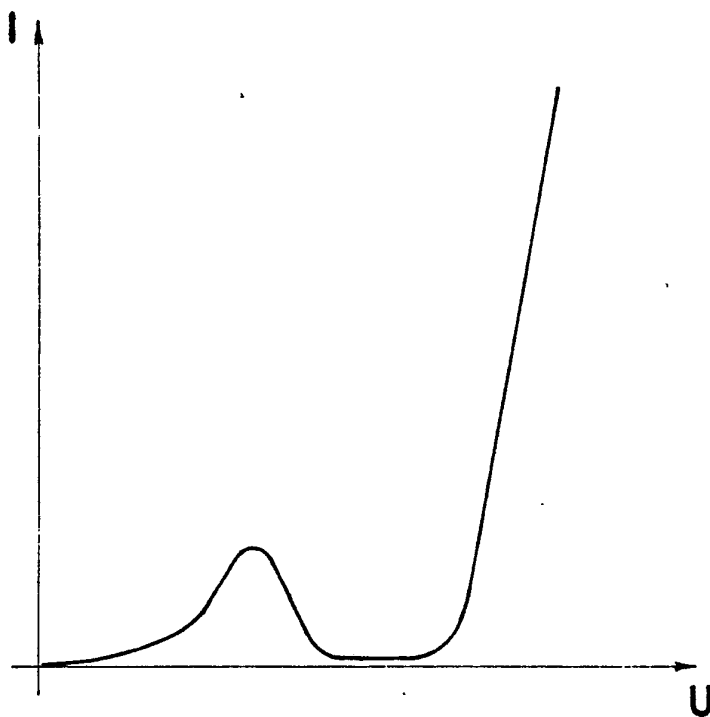


Fig 4

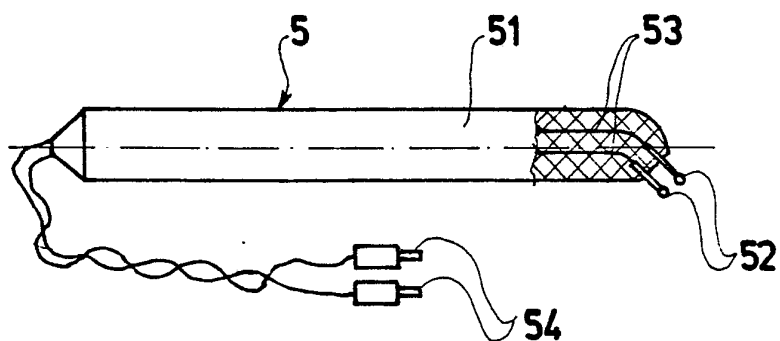


Fig 5

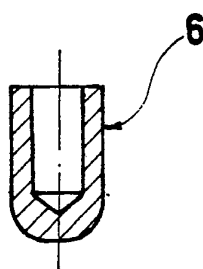
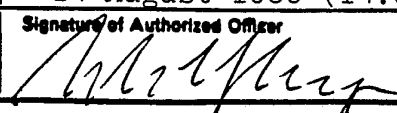


Fig 6

INTERNATIONAL SEARCH REPORT

International Application No PCT/HU 86/00025

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) *		
According to International Patent Classification (IPC) or to both National Classification and IPC		
IPC ⁴ : A 61 B 5/05, A 61 C 19/04, A 61 F 2/76		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
Int.Cl. ⁴	A 61 C 19/04; G 01 N 17/00, 27/26, 27/30, 27/46; A 61 B 5/05; A 61 F 2/76; G 01 R 15/08, 15/12, 19/00	
Documentation Searched other than Minimum Documentation to the extent that such Documents are Included in the Fields Searched ⁸		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹		
Category ⁹	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
A	BIOMEDIZINISCHE TECHNIK, vol. 28, no. 7/8, published July/August 1983, by W.Winkler - Gnieweck et al.: "Untersuchung der Reibkorrosion an mehrteiligen Spezialendoprothesen unter Berücksichtigung der Werkstoffkombination", see pages 160-167.	(4)
A	SU, A, 762 850 (OMSK MED.) 15 September 1980 (15.09.80). & Soviet Inventions Illustrated, section P, week D 21, issued 1981, July 1, Derwent Publications LTD., London, P 31, see SU 762 850.	(4)
A	US, A, 3 650 265 (ST. FIGAR) 21 March 1972 (21.03.72), see totality.	(4)
A	US, A, 4 184 486 (L.PAPA) 22 January 1980 (22.01.80), see totality.	(4)
A	DE, A1, 2 448 459 (W. MÖLLER et al.) 24 April 1975 (24.04.75), see totality.	(4)
* Special categories of cited documents: ¹⁰ "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "&" document member of the same patent family		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search		Date of Mailing of this International Search Report
12 August 1986 (12.08.86)		14 August 1986 (14.08.86)
International Searching Authority		Signature of Authorized Officer
AUSTRIAN PATENT OFFICE		

FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

A DE, B2, 2 731 989 (H. PEESEL) 7 August 1980 (4)
(07.08.80), see totality.

V. ☒ OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE ¹

This international search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. ☒ Claim numbers 1,2,3 because they relate to subject matter not required to be searched by this Authority, namely:

Article 17, rule 39.1.iv

2. ☐ Claim numbers because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claim numbers because they are dependent claims and are not drafted in accordance with the second and third sentences of PCT Rule 6.4(a).

VI. ☐ OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING ²

This International Searching Authority found multiple inventions in this international application as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.

2. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:

3. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:

4. ☐ As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remark on Protest

☐ The additional search fees were accompanied by applicant's protest.

☐ No protest accompanied the payment of additional search fees.

Anhang zum internationalen Recherchenbericht über die internationale Patentanmeldung Nr.

In diesem Anhang sind die Mitglieder der Patentfamilien der im obengenannten internationalen Recherchenbericht angeführten Patentedokumente angegeben. Diese Angaben dienen nur zur Unterrichtung und erfolgen ohne Gewähr.

Annex to the International Search Report on International Patent Application No. PCT/HU 86/00025

This Annex lists the patent family members relating to the patent documents cited in the above-mentioned International search report. The Austrian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Annexe au rapport de recherche internationale relatif à la demande de brevet international n°.

La présente annexe indique les membres de la famille de brevets relatifs aux documents de brevets cités dans le rapport de recherche internationale visé ci-dessus. Les renseignements fournis sont donnés à titre indicatif et n'engagent pas la responsabilité de l'Office autrichien des brevets.

Im Recherchenbericht angeführtes Patentdokument Patent document cited in search report Document de brevet cité dans le rapport de recherche	Datum der Veröffentlichung Publication date Date de publication	Mitglied(er) der Patentfamilie Patent family member(s) Membre(s) de la famille de brevets	Datum der Veröffentlichung Publication date Date de publication
SU-A - 762 850	15/09/1980	None	
US-A -3 650 265	21/03/1972	None	
US-A -4 184 486	22/01/1980	None	
DE-A1-2 448 459	24/04/1975	CH-A - 561 907 FR-A1-2 247 725 FR-B3-2 247 725 GB-A -1 469 690 US-A -3 973 555	15/05/1975 09/05/1975 22/07/1977 06/04/1977 10/08/1976
DE-B2-2 731 989 -A1- -C3-	07/08/1980 18/01/1979 16/07/1981	None	