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(54) **DEVICE AND METHOD FOR CARRYING OUT SPATIALLY DIRECTED DETECTION OF AN ELECTROENCEPHALOGRAM**

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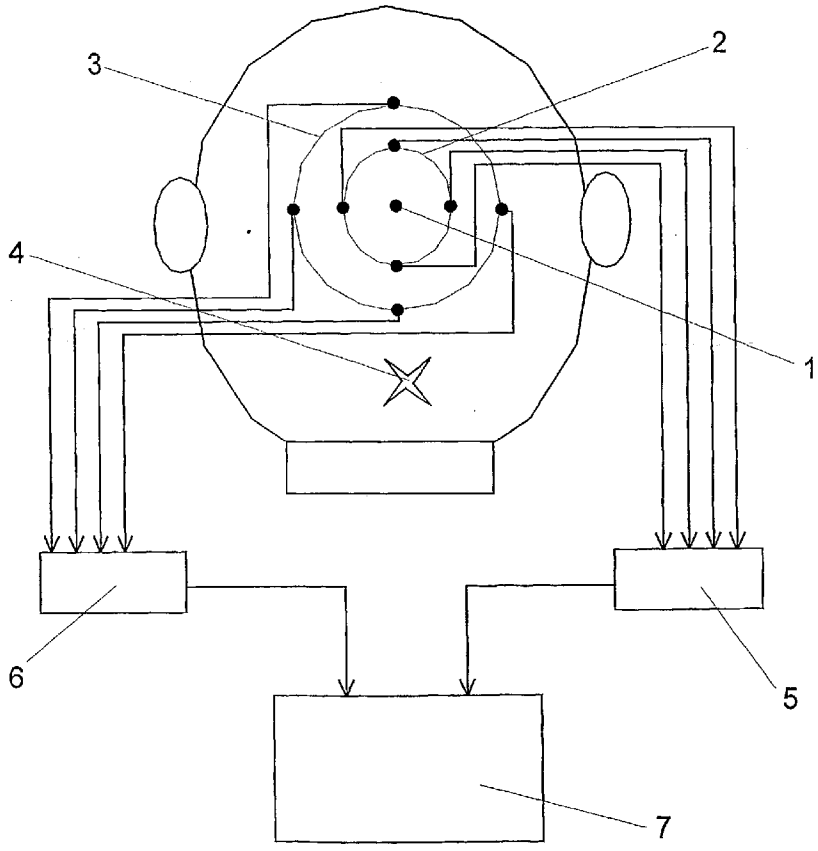
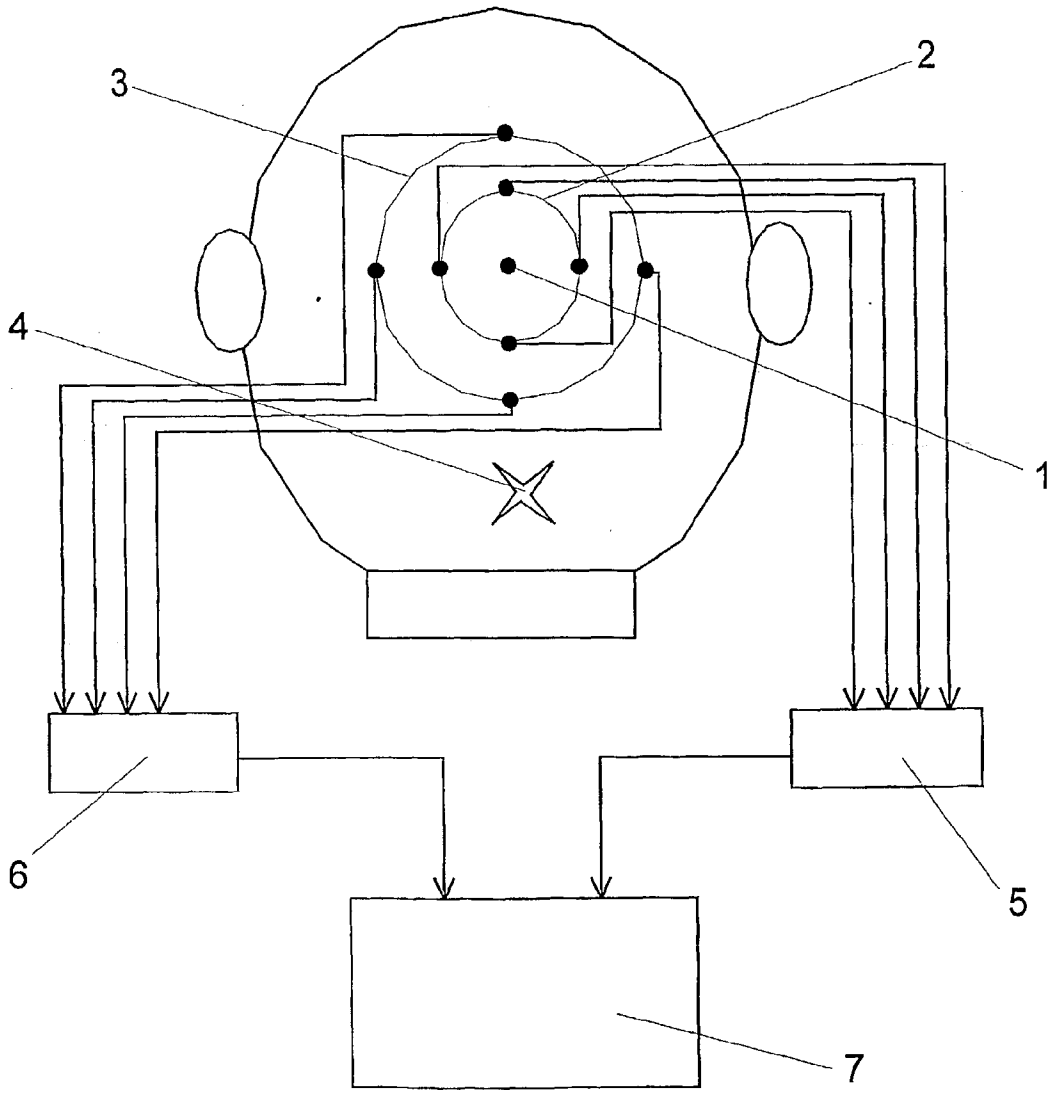
(57) **ABSTRACT**

The invention concerns an arrangement and a procedure for the spatial directed capturing of the electro encephalogram from selected brain areas with electrodes that are attached on the skull surface of an examined person.

According to the invention, several electrodes are arranged on the skull surface in such a way, that a part of the electrodes capture the electrical activity generated from the targeted brain area. Another part of the electrodes captures the electrical activity from the targeted area and the disturbing electrical activity generated by the adjacent areas. This is considerably reduced with the help of an electronic circuit and methods of signal processing.

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DEVICE AND METHOD FOR CARRYING OUT SPATIALLY DIRECTED DETECTION OF AN ELECTROENCEPHALOGRAM

SCOPE OF THE INVENTION

[0001] The invention concerns an arrangement and a procedure for the spatial directed capturing of the electro encephalogram from selected brain areas.

LATEST TECHNOLOGY

[0002] The latest technology knows systems that capture the EEG with suitable electrodes at pre-defined standardized positions and feed it to an amplifier. The disadvantageous effect is that the electrical activity can only be captured from relatively large areas of the brain.

[0003] But in many medical problems of neurology, physiology or the function diagnostic the local brain activity of certain anatomical limited areas or centers is of more essential significance. A series of extensive signal processing steps is necessary to capture the electrical activity of such areas and to free them from disturbances by the adjacent brain areas. For that the amplified EEG must be digitalized and afterwards analyzed in a computer.

[0004] A big disadvantage of this procedure is that only an offline analysis is possible. Therefore, this procedure can not be used in time critical procedures either.

DESCRIPTION OF THE INVENTION

[0005] The task of the invention is therefore to supply a procedure and an arrangement in which the local electrical activity of a spatial limited brain area is captured and can be used for further processing and/or analysis. At the same time the affecting and disrupting fields from the adjacent brain areas on the desired area to be examined shall be considerably suppressed in their projection on the deviated potential.

[0006] According to the invention, it is intended with an arrangement for the spatial directed capturing of an electro encephalogram, in which electrodes are attached to the skull surface of the examined person, that

[0007] parts of the electrodes are arranged in such a way that they capture the activity of the targeted cortical structure, and

[0008] other parts of the electrodes are arranged in such a way that they capture the activity of the targeted cortical structure and the activity of the surrounding areas and furthermore

[0009] an electronic evaluation circuit exists.

[0010] In an advantageous advancement of the arrangement according to the invention, the electrodes are axial symmetrically arranged around a reference electrode in an inner ring and an outer ring.

[0011] The invention furthermore concerns a procedure for the spatial directed capturing of the electro encephalogram, in which the electrical activity is measured

[0012] over the targeted cortical structure as well as

[0013] over the targeted cortical structure and the adjacent area and

[0014] the received potentials are amplified and feed to an electrical circuit.

[0015] In an advantageous advancement of the procedure according to the invention it is intended that the spatial directional pattern for the capturing of the activity of a targeted cortical structure is realized with algorisms of the signal processing.

[0016] The arrangement on hand, according to the invention, and the procedure belonging to it is characterized in a way that the electrical activity of the targeted brain area is freed from disturbances simultaneously to the EEG capturing. In traditional capturing methods this is only possible with the help of offline analyzes, meaning with methods of signal processing that are based on several repetitions of the measurement and are therefore clinically realized in a lot of cases with unacceptable delays.

SHORT DESCRIPTION OF THE DRAWING

[0017] In the following the invention is explained with the help of a drawing that shows the general design of a spatial directed EEG capturing.

DETAILED DESCRIPTION OF THE DRAWING

[0018] The arrangement shown can be used for the examination on the visual cortex. A double ring is attached on the skull surface over the visual cortex of the patient above the inion **4**. The number of the used electrodes depends on the respective technical equipment. They are axial symmetrically arranged around the reference electrode **1**.

[0019] The inner electrode ring **2** is positioned directly above the ROI (region of interest—the target area). Its measurements have to be selected depending on the known anatomical characteristics.

[0020] The outer electrode ring **3** additionally covers the activity of the areas surrounding the ROI. The electrode potentials of the inner ring **2** and the outer ring **3** are amplified with common EEG amplifiers **5** and **6** and fed to the electronic block **7**. The electrical direction pattern of the electrodes configuration and the interference suppression of adjacent brain areas is realized with a suitable analog and digital circuit technology as well as algorithm implemented in a micro controller or signal processor. The formed difference of the activities of both brain volumes creates an almost undisturbed activity of the examined area (ROI). The examined person can already receive diagnostically relevant information during the reception of the brain potentials.

1. Arrangement for the spatial directed capturing of an electro encephalogram with electrodes attached on the skull surface of an examined person, characterized in a way, that a part of the electrodes are arranged in such a way that they capture the activity of the targeted cortical structure, another part of the electrodes in such a way that they capture the activity of the targeted cortical structure and the surrounding areas and that an electronic evaluation circuit exists.

Arrangement according to claim 1, characterized in a way, that the electrodes are axial symmetrically arranged around a reference electrode (**1**) in an inner ring (**2**) and an outer ring (**3**).

Procedure for the spatial directed capturing of an electro encephalogram, characterized in a way, that the electrical activity is captured over the targeted cortical structure and over the targeted cortical structure and the adjacent areas and that the received potentials are amplified and fed to an electronic circuit.

Procedure according to claim **3**, characterized in a way, that the cortical direction characteristic for the capturing of the activity of a targeted cortical structure is realized with algorithm of the signal processing.

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