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Nervous system excitation device

Images (2)

Classifications

- H04R1/40 Arrangements for obtaining a desired directivity characteristic

US3932279A
Jul 13, 1976
Expired - Lifetime

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Inventor: Flanagan Sells Patrick

Current Assignee : Bioelectron Inc., LISTENING Inc

Worldwide applications

0 - 3E - 1962 US

Application events

1962-03-13 • Application filed by LISTENING Inc
1962-03-13 • Priority to US17903762
1963-03-06 • Priority claimed from FR926070A
1968-07-16 • Application granted
1968-07-16 • Publication of US3932279A
1984-06-04 • Assigned to BIOLECTRON, INC., 200 HOLT ST., HACKENSACK, NJ 07601 & 200 CORP.
1985-07-16 • Anticipated expiration
Status • Expired - Lifetime

Info: Patent citations (10); Cited by (16); Legal events; Similar documents; Priority and Related Applications

External links: USPTO; USPTO Assignment; Espacenet; Global Dossier; Discuss

Description

July 16, 1968 S. F. FLANAGAN Filed March 13, 1962 FIG.

2 Sheets-Sheet 1 POWER SUPPLY RF POWER AUDIO SOURCE OF GENERATOR MODULATOR SIGNAL FIGS.

RF FREQUENCY FIG.4.

United States Patent 3,932,279 NERVOUS SYSTEM EXCITATION DEVICE Gilles Patrick Flanagan, Bellevue, Tex., assignor to Listening Incorporated, Arlington, Mass. a corporation of Massachusetts Filed Mar. 13, 1962, Ser. No. 179,337 1 Claim. (Cl. 128-422) This invention relates to a method and apparatus for exciting the nervous system of a mammal and pertains more particularly to a method and apparatus for exciting the nervous system of a person with electromagnetic waves that are capable of causing that person to become conscious of information conveyed by the electromagnetic waves.

It is an object of the present invention to provide a means of initiating controllable responses of the nerve senses without applying pressure waves or stress waves to the ears or bones. Another object of this invention is to provide a means of causing a person to receive an aural perception of the sound corresponding to the audio modulation of radio frequency electromagnetic waves that are coupled with the nervous system of the person. These and other objects of this invention will be apparent from the following drawings and description of the invention, wherein:

FIGURE 1 is a schematic illustration of one form of the present nervous system excitation device.

FIGURE 2 is a circuit diagram of one form of the present nervous system excitation device.

FIGURE 3 is a diagrammatic view illustrating one form of field generator adapted to be used with the device of FIGURE 1.

FIGURE 4 is a diagrammatic view illustrating another form of field generator adapted to be used with the device of FIGURE 1.

The present invention involves the discovery that certain electromagnetic waves induce responses in the nervous systems of mammals. In human beings a response is produced when some or all of a person nervous system is placed within a field of electromagnetic waves having a radio frequency above the audible range. In such electromagnetic waves having a radio frequency above the audible range, the audio information to be transmitted is impressed upon the modulated electromagnetic carrier. Waves of such a frequency, the nervous system is responsive to the modulation of the carrier waves. Each individual nervous system is at least somewhat selective in respect to the frequencies to which it is most responsive. A frequency to which the nervous system of a person is demonstably responsive is hereinafter referred to as the resonant frequency of carrier waves that are modulated by an information signal such as speech or music, and measuring the frequency of such waves that produce the sensation of hearing the sounds corresponding to the modulating signal.

In the method of the present invention, a response is initiated in the nervous system of a mammal by disposing at least a portion of that nervous system within a field of electromagnetic waves of a radio frequency above the aural range. In a preferred embodiment of this invention, the field to which the nervous system is exposed is a field containing modulated electromagnetic waves of a particular radio frequency to which the individual nervous system is selectively responsive. In a particularly preferred embodiment of this invention, at least a portion of the nervous system of a person is disposed within a field of electromagnetic waves having a radio frequency such that the person experiences the sensation of hearing, substantially free of distortion, the information which is conveyed by the audio modulation.

The present invention may be used as a hearing aid, as an aid to teaching speech to a person who was born deaf, as a means of communicating with persons in locations in which the noise level is high, as a device by which a person can listen to an audio signal that cannot be heard by others, etc.

As shown in FIGURE 1 of the drawing, in a preferred form of the invention, a field of electromagnetic waves is generated by a field generating means, such as a pair of electrodes 1. The electrodes 1 are preferably electrically insulated, for example by surrounding them with a suitable electrical insulating material 2, and are arranged to generate a field coupled with at least a portion of the nervous system of a person, for example by being placed near or along opposite sides of a persons head. The electrodes 1 can be placed in direct contact with the skin and the electrodes can be shaped to fit various portions of the body, such portions preferably being near the aural canal.

The electrodes 1 are electrically connected to a source of modulated electromagnetic waves inclusive of a radio frequency power amplifier and variable frequency oscillator, indicated in box 3, an audio modulator, indicated in box 4, a source of audio signal, indicated in box 5, and a power supply for the signal source, modulator and amplifier, indicated in box 6. The variable frequency oscillator 3 is preferably provided with a manual radio frequency control means, indicated by box 3a. Numerous forms of the components, indicated in boxes 3 to 6, that provide means for generating a radio frequency electromagnetic wave, modulating such wave in known and the known devices can suitable be used as long as they are arranged to provide a relatively high voltage output that has a radio frequency above the audio range and is capable of being modulated by an audio signal or other signal adapted to be conveyed by the modulation of electromagnetic waves of such a frequency.

The modulation can suitably be effected by means of either an amplitude or frequency modulation of such electromagnetic waves. These waves preferably have a frequency in the range of from about 30 kilocycles per second to about 200 kilocycles per second. The output of the source of modulated electromagnetic waves is preferably at least about 1 watt where the field generator comprises a pair of insulated electrodes placed on the head of a person. The extent to which a person is responsive to the output supplied at a given voltage is materially increased when at least one of the electrodes is placed in electrical contact with the body of the person.

In a preferred mode of operating the apparatus shown in FIGURE 1, the audio signal source 5 is a microphone or other suitable means for the source of audio signal is actuated to produce an audio signal corresponding to sounds recognizable by that person, and source 3 of modulated electromagnetic waves is actuated to couple the waves with the nervous system of that person. When control 3a is adjusted so that the frequency of the mode- lated waves is a frequency to which his nervous system is particularly responsive, the person to whom the field of such waves is applied has the sensation of hearing the sounds corresponding to the audio signal substantially free of distortion.

In the circuit shown in FIGURE 2, a phase shift type of carrier oscillator, generally designated by dotted rectangle 7, is provided for the source 3 of carrier waves. Amplifier 8 is provided to reduce electromagnetic noises, shown at frequency ranging from about 20 to about 200 kilocycles per second. The oscillator output is coupled through capacitor 9 to a radio frequency power amplifier, generally designated by dotted rectangle 10. Potentiometer 11, which is connected between capacitor 9 and ground, provides a means of adjusting the input to the amplifier. Switch 12, which is connected to the cathode of tube 13 of the amplifier, provides a means of switching between resistors 14 and 15 to vary the operating power characteristics of the tube.

The output of amplifier 10 is connected to transformer 16 which is coupled back-to-back with transformer 17. This arrangement of transformers provides an isolation of the output of the amplifier from the modulator and the output of the source from other components of the circuit. Resistor 18 connected across the output side of transformer 17 serves to reduce any dangerous voltage spikes which might be produced. The output side of transformer 17 is connected to a suitable field generator, which may comprise the electrodes 1 surrounded by insulating material 2.

The output of amplifier 10 is amplitude modulated by means of the modulator generally designated by dotted rectangle 19. A fluctuating electrical signal 8, preferably of audio frequency is applied to the modulator by means of input jack 20 and transformer 21. The output of the modulator varies the screen voltage of tube 13 of the amplifier so that the modulation envelope of the current oscillation 7 corresponds to the load of tube 13 corresponds to the fluctuating signal 8 applied to the modulator.

Potentiometer 22 is connected to the cathode of tube 23 as the cathode resistor of tube 23. Potentiometer 22 is preferably adjusted so that the plate current of tube 23 is at a value which is approximately one-half the value of the maximum modulation. It is then adjusted to cause the plate current of tube 23 to vary between the maximum and minimum values so that a large current variation occurs in the load 14 of tube 13.

The apparatus shown in FIGURE 2 has been used to communicate speech and music to numerous persons including registered physicians. In these uses the electrodes 1 in the form of circular disc covered by a plastic insulation 2, were placed against the sides of the heads of the persons. When the electromagnetic waves were adjusted to a frequency to which persons having normal hearing were responsive, such persons reported that they had the sensation of hearing the sounds or experienced only discomfort when no audio modulation was applied to the waves. When the waves were audio modulated with a speech or music signal, none of these persons experienced any discomfort, but they each had the sensation of listening to the transmitted information and hearing it at least as clearly as they would hear such information from an audible transmitter. When the same apparatus was similarly employed on a person whose hearing had been damaged to a point requiring a hearing aid to hear normal conversations, that person heard the audio signal (with the hearing aid disconnected) and heard music with a better fidelity than that obtainable with his hearing aid.

FIGURE 3 shows an arrangement for mounting the field generating means in a manner suitable for use in a hearing aid for a person who is deaf in both ears and out of coupling with the field at the will of the person. In this arrangement, electrodes 1 surrounded by insulation 2 are mounted in vertical alignment along the back of a seating device, such as chair 24. When a person is seated and leaning back in the chair, portions of his nervous system are brought into coupling relationship with the field produced by electrodes 1.

FIGURE 4 shows an alternative arrangement of the field generating means. In this arrangement, inductive coil 25 is connected to the output of a suitable source of modulated electromagnetic waves and serves as a field generating means which is adapted to be placed around the head of a person.

It is to be understood that the above embodiment examples have been presented fordescriptive purposes and that, within the scope of the appended claims, the invention may be practiced otherwise than specifically illustrated and described.

I claim:

1. A method of transmitting audio information to the brain of a subject through the nervous system of the subject which method comprises, in combination, the steps of generating a radio frequency signal having a frequency in excess of the highest frequency of the audio information to be transmitted, modulating said radio frequency signal with the audio information to be transmitted, and applying said modulated radio frequency signal to a pair of insulated electrodes and placing both said insulated electrodes in physical contact with the skin of said subject in the strength of said radio frequency electromagnetic field being high enough to the skin surface to cause the sensation of hearing the audio information modulated thereon in the brain of said subject and low enough so that said subject experiences no physical discomfort.

2. The method of claim 1 wherein said modulated electromagnetic field is coupled with a portion of the nervous system contained in the persons spinal column.

3. Apparatus for transmitting audio information to the brain of a subject through the nervous system of the subject which comprises, in combination, means for generating a radio frequency signal having a frequency greater than the maximum frequency of said audio information, means for modulating said radio frequency signal with the audio information to be transmitted, electrode means adapted to generate a localized radio frequency electromagnetic field thereabout when excited by a radio frequency signal, and means coupling said modulated radio frequency signal to said electrode means, said electrode means having a surface adapted to be placed in physical contact with the skin of said subject, said field being so disposed when placed in physical contact therewith whereby said electrode means may generate a localized radio frequency electromagnetic field modulated by said audio information at the surface of the skin of said subject, and means on said surface of said electrode means for the transmitting said audio information from the skin of said subject.

References Cited UNITED STATES PATENTS 2,715,993 2/1955 Pulvanich et al. 179-107 1,651,236 3/1911 Bachner 128/1.5 1,125,064 12/1914 Reed 128/1.5 2,004,751 6/1935 Fischer 128-422 X 2,102,440 12/1937 Weissenberg 128/1.5 2,118,594 5/1938 Dresden 128/1.5 2,405,653 8/1946 Hart 128/1.5 X 2,715,120 7/1955 Mendelsohn 128-422 X 1,729,207 9/1929 Eichhorn 179/107 2,890,630 6/1961 Hansen et al. 128-422 X 2,900,465 8/1959 Ruhlenbrauer, pp. 22, 23, IRE Transactions on Med. Electronics March 1959.

KATHLEEN H. CLARYE, Primary Examiner.

ROBERT H. ROSE, Examiner.

I. W. JOHNSON, R. A. MCGILL, Assistant Examiners.

Claims (1)

Hide Dependent

1. A METHOD OF TRANSMITTING AUDIO INFORMATION TO THE BRAIN OF SUBJECT THROUGH THE NERVOUS SYSTEM OF THE SUBJECT WHICH METHOD COMPRISES, IN COMBINATION, THE STEPS OF GENERATING A RADIO FREQUENCY SIGNAL HAVING A FREQUENCY IN EXCESS OF THE HIGHEST FREQUENCY OF THE AUDIO INFORMATION TO BE TRANSMITTED, MODULATING SAID RADIO FREQUENCY SIGNAL WITH THE AUDIO INFORMATION TO BE TRANSMITTED, AND APPLYING SAID MODULATED RADIO FREQUENCY SIGNAL TO A PAIR OF INSULATED ELECTRODES AND PLACING BOTH OF SAID INSULATED ELECTRODE IN PHYSICAL CONTACT WITH THE SKIN OF SAID SUBJECT, THE STRETCH OF SAID RADIO FREQUENCY ELECTROMAGNETIC FIELD BEING HIGH ENOUGH AT THE SKIN SURFACE TO CAUSE THE SENSATION OF HEARING THE AUDIO INFORMATION MODULATED THEREON IN THE BRAIN OF SAID SUBJECT AND LOW ENOUGH SO THAT SAID SUBJECT EXPERIENCES NO PHYSICAL DISCOMFORT.

Patent Citations (10)

Publication number	Priority date	Publication date	Assignee	Title
US1651236A *	1908-08-07	1911-08-22	Emile Bachner	Electromagnetic sound-wave therapeutic apparatus.
US1125064A *	1913-06-03	1914-12-15	John H Reed	Therapeutic apparatus.
US2118594A *	1936-09-11	1929-11-12	Eichhorn Gustav	Apparatus for amplifying low-frequency speech currents of radio receivers
US2004751A *	1931-03-23	1935-06-11	H G Fischer & Company	Low voltage generator
US2102440A *	1932-07-15	1937-12-28	Weissenberg Eugen	Electrotherapeutic apparatus
US2118594A *	1933-12-28	1938-05-24	Rca Corp	Permanent wave machine
US2405653A *	1945-09-12	1946-03-30	College Of Electronic Medicine	Electrical therapeutic device
US2715120A *	1952-10-22	1955-07-12	Mindoffady David	Electronic stimulator
US2900630A *	1958-09-25	1961-08-08	Henry K Pulvanich	Means for aiding hearing
US1729207A *	1962-01-08	1963-02-23	Henry K Pulvanich	Means for aiding hearing by electrical stimulation of the facial nerve system

Family To Family Citations

* Cited by examiner, † Cited by third party

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Publication number	Priority date	Publication date	Assignee	Title
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US3624684A *	1968-12-13	1971-11-30	Welcome Foundation Ltd Inc Th	Oscillator output circuit configuration
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US4515165A *	1979-08-06	1977-03-19	Critical Systems	Method and apparatus for treating tissues, in particular for treating tumors
US4229360A *	1979-08-04	1980-09-02	Electro-Physical Research, Incorporated	Hearing aid with modulated suppressed carrier signal
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US9521496B2	2013-05-03	2016-12-20	Corey Charles Snook	Method and system for retraining brainwave patterns using ultra low power direct electrical stimulation feedback
US9584479B2	2013-09-30	2017-03-07	Ronald Dell Davis	Natural orientation induction tool apparatus and method

Family To Family Citations

* Cited by examiner, † Cited by third party, ‡ Cited by family citation

Similar Documents

Publication	Title
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US3267921A	Electrically stimulated hearing with signal feedback
US3563246A	Method and apparatus for improving neural performance in human subjects by electrotherapy
US2164121A	Electric hearing apparatus for the deaf
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US2855647A	Loud speakers
US5266425A	Improvements in electro-static sound reproducers or transmitters
US3586791A	Method and apparatus for hearing by bioderection and bioransduction of radiofrequency energy
JP4052115B2A	Therapeutic apparatus
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US3766331A	Hearing aid for producing sensations in the brain
Hirsch	Perception of the range of a sound source of unknown strength
Craig	Hearing
US4849132A	Electrotherapeutic apparatus with body impedance-sensitive intensity regulation
US3267921A	Transducer for stimulation of facial nerve system with rf energy
GB1170666A	Audio system including an electromotive vibrator controlled in accordance with ambient noise
Kono et al.	Some consideration on the auditory perception of ultrasound and its effects on hearing
US2825455A	Application of electric impulses to the body by recording means
US3586806A	Method and apparatus for treatment of the deafness caused by diseases of the middleand internal ear
JP2002502205A	Multiple stimulation type interference low frequency treatment instrument
US1678566A	Method for aiding audition
EP3842265A1	Bone conduction apparatus having tens therapy function

Priority And Related Applications

Priority Applications (1)

Application	Priority date	Filing date	Title
US17903762	1962-03-13	1962-03-13	Nervous system excitation device

Applications Claiming Priority (3)

Application	Filing date	Title
8G3294780		
US17903762	1962-03-13	Nervous system excitation device
FR926070A	1963-03-06	Method and apparatus for stimulating the nervous system of a mammal by electromagnetic waves

Legal Events

Date	Code	Title	Description
1984-06-04	AS	Assignment	**Owner name:** BIOLECTRON, INC., 200 HOLT ST., HACKENSACK, NJ 076 **Free format text:** ASSIGNMENT OF ASSIGNORS INTEREST, ASSIGNOR:CHEN, C.Y.;REEL/FRAME:004271/0859 **Effective date:** 19840530

Concepts

machine-extracted

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Name	Image	Sections	Count	Query match
nervous system		title,claims,description	27	0.000
excitation		title,description	5	0.000
modifying		claims,description	37	0.000
Skin		claims,description	8	0.000
sensation		claims,description	7	0.000
Brain		claims,description	5	0.000
electromagnetic field		claims,description	5	0.000

Show all concepts from the description section

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