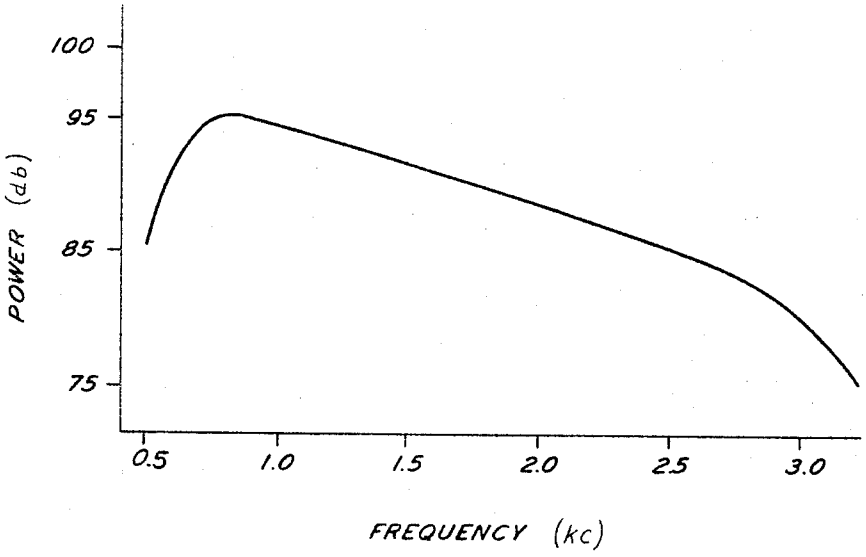
Sept. 13, 1966 B. E. BALKIN 3,272,198

METHOD FOR INDUCING STATE OF REDUCED AWARENESS

Filed July 29, 1963



INVENTOR.
BURTON E. BALKIN

BY Arthur H. Seidel

ATTORNEY

United States Patent Office

3,272,198

Patented Sept. 13, 1966

3,272,198

METHOD FOR INDUCING STATE OF REDUCED AWARENESS

Burton E. Balkin, Philadelphia, Pa.
(304 Old Lancaster Road, Merion, Pa.)

Filed July 29, 1963, Ser. No. 298,206
7 Claims. (Cl. 128—1)

The present invention is directed to a method of inducing in human beings a state of reduced awareness and loss of pain sensibility, without the use of drugs or electric current.

There has been a long felt need for a process for safely and readily inducing in human beings of all ages and of all intelligence levels a state of reduced awareness and partial loss of pain sensibility without the use of drugs or electric current. Thus, it is exceedingly desirable to induce this state in a wide variety of medical, dental and psychological situations. By way of example and not by way of limitation, it is frequently desirable to be able to induce this state in connection with dental surgery, general surgery, childbirth, psychotherapy, etc.

An approach has heretofore been made by the use of so-called "white noise." This approach involves the use of a broad spectrum of sound at very high acoustic levels. It depends upon the acceptance of the suggestion that "analgesia" would be induced in the patient. Furthermore, "white noise" is dependent upon the patient's co-operation in operating the device by adjusting the acoustic power level. Customarily, it has been necessary for the operator to monitor the use of "white noise." In the main, this use of "white noise" has proved to be unsatisfactory for a number of reasons. Thus, due to the use of high acoustic levels, temporary partial hearing impairment is routine, and injury has been encountered with a number of patients including alleged permanent damage to hearing. Furthermore, the state of "analgesia" which can be achieved by the use of "white noise" with many patients is not satisfactory for many types of medical situations.

This invention has as an object the provision of a method for achieving a state of reduced awareness and loss of pain sensibility which is non-injurious to the subject, which may be practiced by the use of simple apparatus, and which has broad application to the widest possible variety of medical, dental, and psychological situations with the widest possible variety of subjects.

This invention has as another object the provision of a method of the aforesaid type which enables the operator to determine when the state of reduced awareness and loss of pain sensibility has been reached.

This invention has as still another object the provision of a method of the aforesaid type in which the awareness of pain is minimized or banished while simultaneously the subject retains an awareness of touch.

A still further object of the present invention is the provision of a method of removing the subject from the state of reduced awareness, which removal may be accomplished exceedingly rapidly.

A still further object is the provision of a method of the aforesaid type in which no recovery interval is required for the dissipation of the effects.

A still further object is the provision of a method of the aforesaid type in which neither temporary nor permanent auditory damage is encountered.

A still further object of the present invention is the provision of a method of the aforesaid type which may be practiced by an operator lacking training and skill without the possibility of injury to the subject.

A still further object of the present invention is the provision of a method of the aforesaid type without any necessity for suggesting the efficacy of the method to the subject.

A further object of the present invention is the provision of a method in which the subject's cooperation in the operation of the method is unnecessary.

Other objects will appear hereinafter.

The method of the present invention comprises the induction of a state of reduced awareness and loss of pain sensibility by exposing the subject to a continuous pulsative sound within the frequency range of 500 to 3000 cycles per second. Preferably, the subject is isolated from all other sound sources. At the peak, the acoustic level should be within the range of 60 to 100 decibels, and preferably 80 to 95 decibels. It is necessary that there be between 1 and 10 pulses per second, preferably at a fixed rate for an appreciable interval. The pulses must have either a rise or fall time of 3 milliseconds or less.

While the peak power is within the range of 60 to 100 decibels, I have found that the peak power distribution with respect to frequency is optimum as shown in the accompanying graph for comfort and safety with most subjects.

As a general rule, the state of reduced awareness and loss of pain sensibility is induced in the subject within 2 to 15 minutes, with an average induction time of the order of 5 minutes. It is normally preferable during the initial induction period, such as for about the first minute or so, to gradually increase the power to the desired operable level. It is readily ascertainable for the operator to determine when the state of reduced awareness and loss of pain sensibility has been reached, as the subject becomes slightly agitated with a slight rise in blood pressure, pulse rate, and respiration rate. This is followed within a short time interval, such as of the order of less than a minute to a few minutes, by a drop in the blood pressure, pulse rate, and respiration rate. Typically, this drop is to a level which is slightly below the base level observed in the subject at the commencement of the process. For example, with a subject having a pulse of 70 beats per minute, there may be a rise to 74 beats per minute when the state of reduced awareness and loss of pain sensibility is induced, followed by a dropping to a pulse rate level of the order of 68 beats per minute. Comparable values are obtained in respect to blood pressure and respiration rate.

A preferred embodiment of practicing the method of the present invention is to position the subject comfortably, and apply a set of headphones to the subject's ears. The pulses are introduced to the subject's ears through the earphones. The peak acoustic level should be within the range of 60 to 100 decibels. During the quiet periods between the peak levels, the acoustic level should be at least 20 decibels below the peak. The elimination of distractions to the subject, as by advising the subject to close his eyes, may prove helpful, although it is not necessary.

A preferred embodiment, which has been successfully used on hundreds of subjects, consists of a conventional continuous loop tape reproducer, a bandwidth limited

amplifier and a pair of earphones. A remote power control operated by the operator was used for convenience only. Music was used as the carrier with a fixed pulsative rate of 3.6 pulses per second. The intervals between the impulses were 20 decibels below the peak power during the impulses. The envelope rise time (or fall time when tape was played in reverse) was 2 milliseconds to 2.4 milliseconds. The components of the sound reaching the subject were limited to frequencies between 850 to 2400 cycles per second. The subject was isolated from ambient sound. The peak power at 1200 cycles per second reaching the subject's ears was limited to 95 decibels above the threshold of hearing. This was the peak power level.

An accommodation may be made in connection with the acoustical level to compensate for the well-recognized loss due to age or physical condition.

The sound is within the range of 500 to 3000 cycles during the induction of the state of reduced awareness and loss of pain sensibility. This enables musical sounds to be used as a carrier, although due to the narrow frequency range, the musical sounds delivered would be classified as "low fidelity."

I have found that it is essential that the pulses have either a rise or fall time of 3 milliseconds or less. It is possible to use pulses in which both the rise and the fall time are 3 milliseconds or less.

As above-indicated, the quiet periods between the pulses should be at least 20 decibels below the peak level. If possible, the quiet periods should be of lower acoustic power levels than 20 decibels below the peak.

A wide variety of apparatus may be used to achieve the process of the present invention. Thus, the filtering of the sound to the frequency range of between 500 and 3000 cycles per second, preferably 700 to 2500 cycles per second, may be achieved by the use of headphones having a limited frequency response, or by the use of a filter in the system delivering the acoustic energy to the headphones, or a combination thereof, providing the bandwidth limiting does not introduce incoherence or phase distortion.

A convenient system has been to record the sound upon magnetic tape and play the tape through an amplifier/earphone combination having either an appropriate filter in the amplifier and/or limiting the frequency response of the earphones to the aforesaid 500 to 3000 cycles per second pass band.

It is possible to satisfactorily induce the desired state of reduced awareness and loss of pain sensibility using musical sounds as a carrier or medium in which the rhythm provides the continuous bursts or pulses of sound at a fixed rate within the range of 1.0 to 10 pulses per second. For example, the rhythm may be composed of a primary beat and a secondary beat, with the primary beat being at a substantially fixed rate between 40 and 80 times per minute, and the secondary occurring 2, 3 or 4 times per primary beat.

Expressed in terms of musical terminology, the music should be made up of discrete soundings which have fast attack and/or decay. As above-noted, the attack or decay time cannot exceed 3 milliseconds.

Furthermore, when music is used, the rhythm determinant must be dominant and continuous and at a fixed tempo. It is useful for either the melody or the background to be partially percussion, but not both. It is essential that the pulsative component be insistent.

I have found that the method may also be practiced when the pulses (of 1 cycle to 10 cycles per second) are apparently present due to modulation of high frequency tones with very low frequency tones, or due to the presence of harmonics of very low frequency components, namely the so-called Shouten residue phenomenon.

Generally, it is desirable to prevent so-called "auditory fatigue" with consequent temporary loss of auditory sensitivity. I have found that the use of near silence between the pulses markedly reduces "auditory fatigue." The elimination of "auditory fatigue" permits sustained use of my method.

It is possible to practice the method of the present invention using acoustic power levels in excess of 100 decibels. However, this is generally unnecessary and undesirable because of the possibility of permanent damage when acoustic power levels in excess of 120 decibels are reached (in actuality, there is an appreciable margin for error between the lowest levels at which injury to the subject is possible and the value of 100 decibels within the frequency range of 500 to 3000 cycles per second; it being well-recognized that the minimum acoustic power level which produces injury in humans varies depending upon the frequency).

I have achieved a state of reduced awareness and loss of pain sensibility using the method of the present invention with subjects of all ages, of both sexes, and of differing physical conditions. Except with subjects having marked impairment of hearing, the degree of success achieved by the method of the present invention exceeds substantially all prior known physical techniques for inducing reduced awareness and loss of pain sensibility. I have not observed any adverse side or after effects in any of the subjects upon whom the method of the present invention has been practiced.

There is a rapid withdrawal from the state of reduced awareness and loss of pain sensibility upon the cessation of the continuous pulsative sound. In many cases, a subjective euphoric feeling accompanies the awakening of the subject from this state of reduced awareness and loss of pain sensibility.

While I do not wish to be bound by any theory, I believe that the state of reduced awareness and loss of pain sensibility induced by the method of the present invention differs from the states induced by presently used techniques for performing medical, dental and psychotherapeutic treatments.

I have observed that subjects retain an awareness of touch while at the same time undergoing an inhibition of pain upon the induction of the method of the present invention. I believe that in my method the inhibitory stimulation impulses are generated within the neurological tissue somewhat analogously to a shallow form of electronarcosis. Of course, my method differs markedly from electronarcosis in that it is far safer because no electrical impulses are introduced from an external source, as in electronarcosis.

The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof and, accordingly, reference should be made to the appended claims, rather than to the foregoing specification as indicating the scope of the invention.

I claim:

1. A method for inducing in a human subject a state of reduced awareness and loss of pain sensibility which comprises exposing the subject to a continuous pulsative sound within the frequency range of 500 to 3000 cycles per second, such sound having between 1 and 10 pulses per second, a peak power of between 60 to 100 decibels during each of said pulses, with each of said pulses having a rise or fall time of no more than 3 milliseconds, and with the acoustic level between pulses being at least 20 decibels below the peak.

2. A method in accordance with claim **1** in which the frequency range of the sound is between 700 and 2500 cycles per second.

3. A method in accordance with claim **1** in which musical sounds are used as a carrier for the continuous pulsative sound, with sounds having frequencies of below 500 cycles per second and above 3000 cycles per second being removed.

4. A method in accordance with claim **1** in which the pulses are derived from a rhythm having a primary beat

and a secondary beat, with the primary beat being between 40 and 80 times per minute, and the secondary beat between 2 and 4 times per primary beat.

5. A method in accordance with claim 1 in which the pulsative sound has a substantially fixed pulsative rate.

6. A method in accordance with claim 1 in which the pulsative sound has a peak power level of 80 to 95 decibels.

7. A method in accordance with claim 1 in which the subject is isolated from all other sound sources.

References Cited by the Examiner

UNITED STATES PATENTS

1,983,737	12/1934	Davenport.	
3,140,709	7/1964	Weisz	128—303.1

FOREIGN PATENTS

1,220,301	1/1960	France.

RICHARD A, GAUDET, *Primary Examiner.*

G. McNEILL, *Assistant Examiner.*