Jan. 21, 1958 R. MAYNE 2,820,453

APPLICATION OF ELECTRIC IMPULSES TO THE BODY BY RECORDING MEANS

Filed July 7, 1953 3 Sheets-Sheet 1

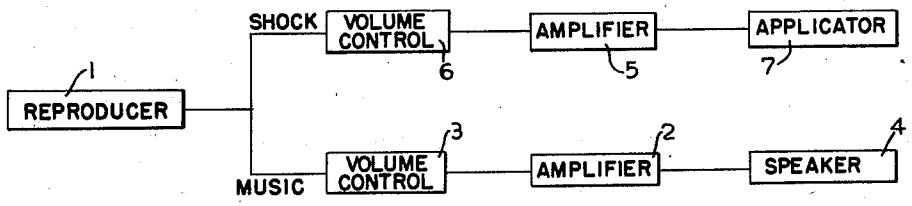


FIG. 1

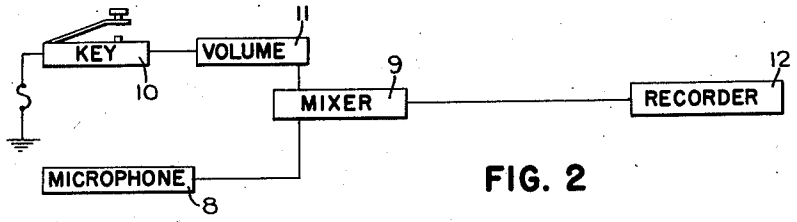


FIG. 2

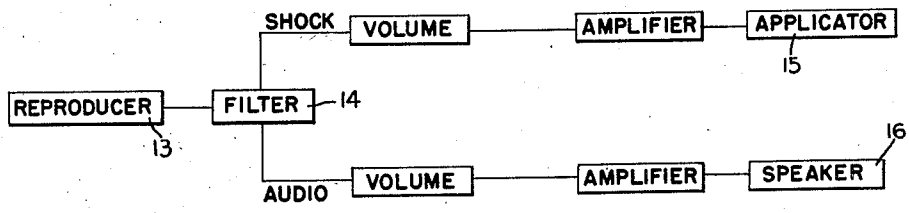


FIG. 3

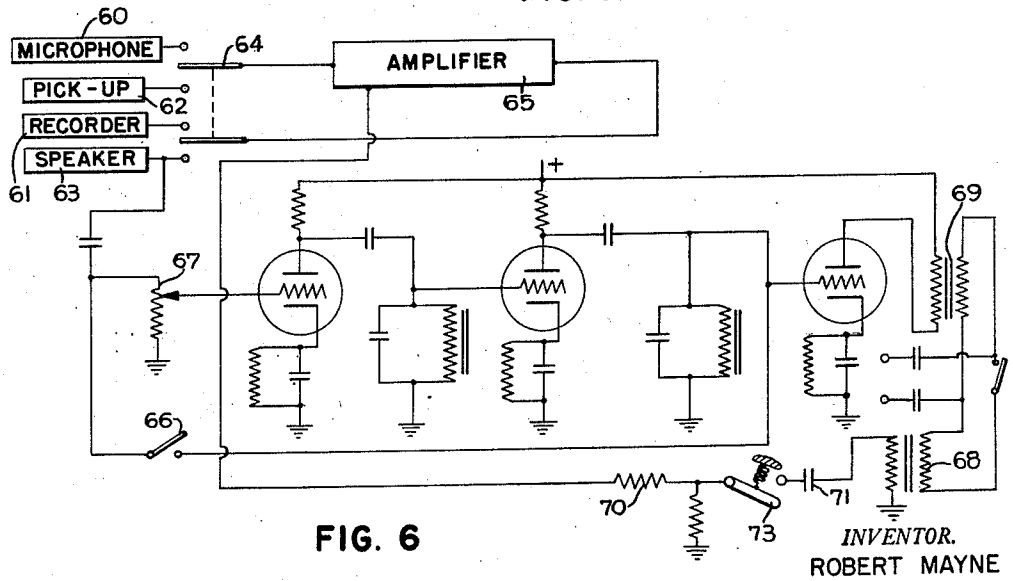


FIG. 6

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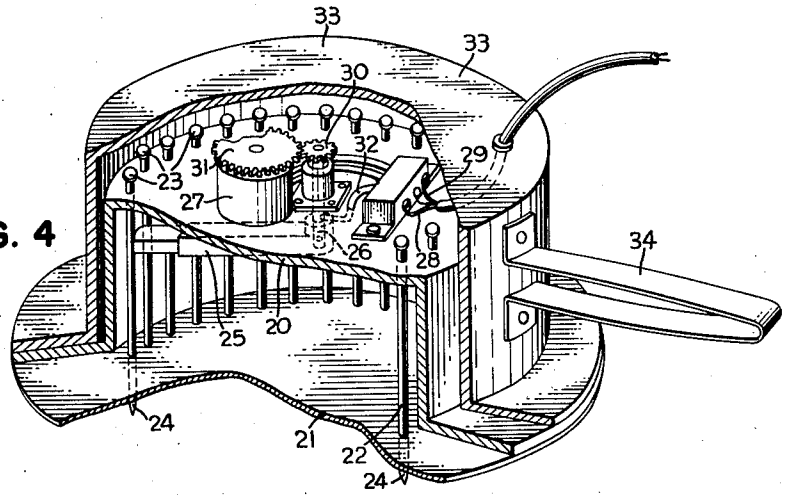
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Filed July 7, 1953 3 Sheets-Sheet 2

FIG. 4



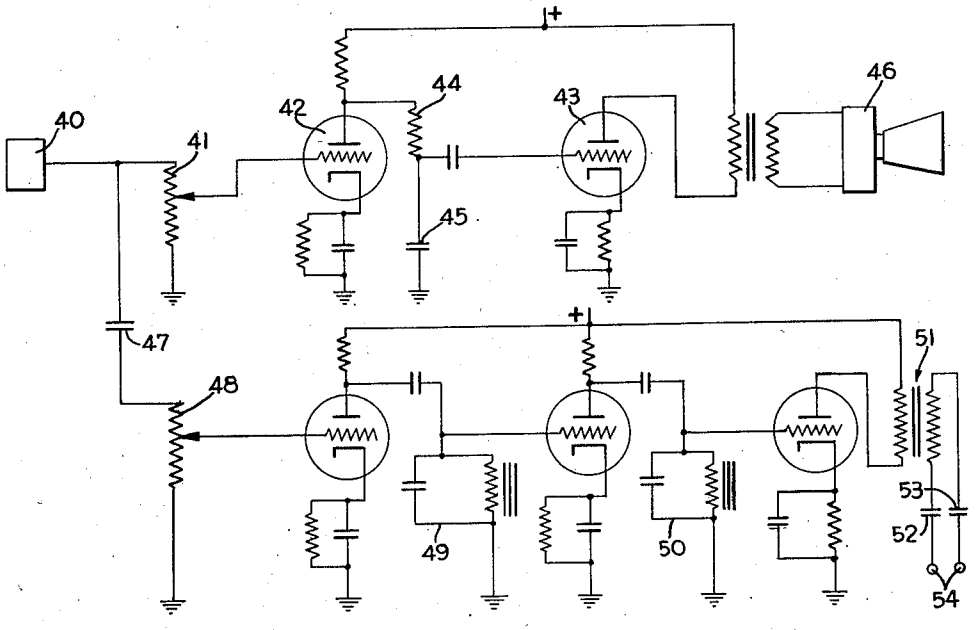


FIG. 5

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Jan. 21, 1958 R. MAYNE 2,820,453
APPLICATION OF ELECTRIC IMPULSES TO THE BODY BY RECORDING MEANS
Filed July 7, 1953 3 Sheets-Sheet 3

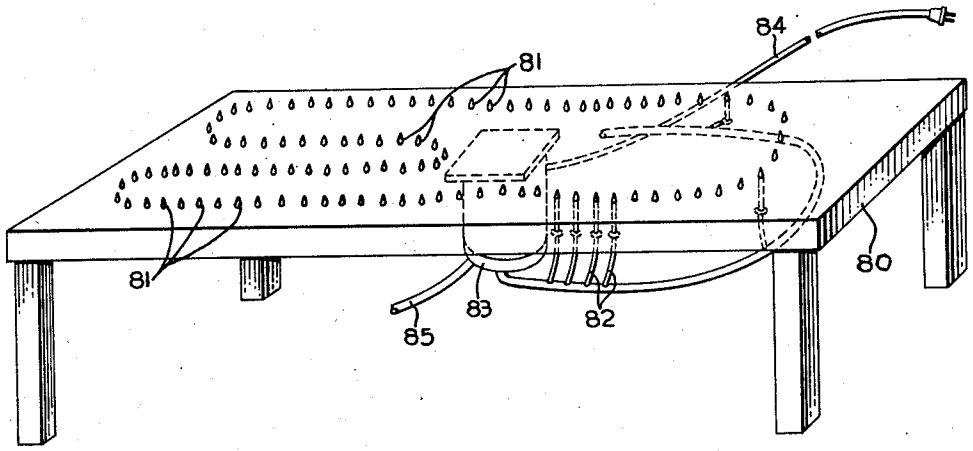


FIG. 8

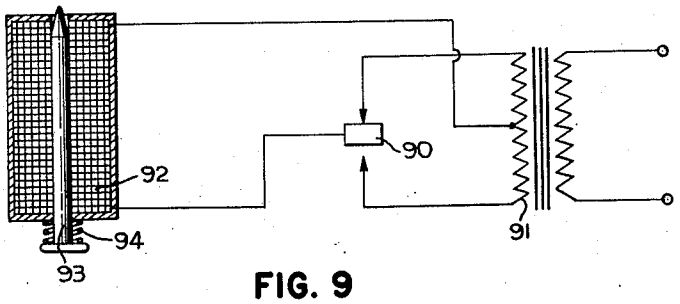


FIG. 9

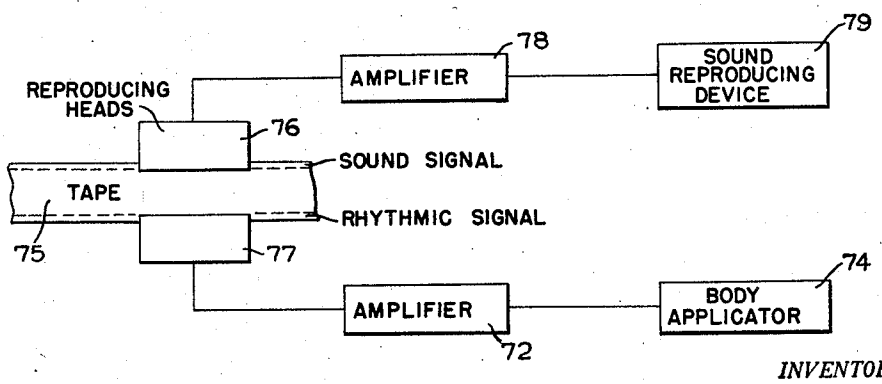


FIG. 7

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2,820,453

APPLICATION OF ELECTRIC IMPULSES TO THE BODY BY RECORDING MEANS

Robert Mayne, Akron, Ohio

Application July 7, 1953, Serial No. 366,469

4 Claims. (Cl. 128—24.5)

This invention pertains to a new therapeutic method and apparatus for the relief and treatment of tensions, mental disorders, or psychosomatic disturbances. The invention pertains to means for producing localized and rhythmic sensations usually in correlation with a musical selection.

The invention is based on the theory that mental and body health require the formation and fulfillment of objectives. Difficulties arise when an excessive amount of frustration or failure to satisfy objectives accumulates or when objectives cease to be formed in a normal manner. In the first case the patient may suffer of nervousness, tension, hyperacidity, ulcers of the stomach, etc. In the second case the patient may suffer from depressions which in extreme cases may cause the patient to be completely removed from his environment and reality as in catatonic schizophrenia. I believe further that both these symptoms can be relieved if the patient can be caused to perform simple mental operations involving the formation and satisfaction of objectives.

My apparatus functions to induce the patient to perform simple anticipatory mental operations in predicting the timing and location of sensations correlated with a musical number, the basis of the anticipation being certain predictable characteristics of the music with which the sensations are correlated. The correlated sensations provide an immediately reward for correct anticipation in that a properly anticipated sensation is more pleasant than one which is unexpected.

It is believed that the simple mental activity involved in carrying out such predictions will relieve tensions, breakdown vicious cycles of anxiety neurosis, promote better health and start some mental patients on the road to recovery. It is believed also that it will relieve psychosomatic disturbances such as certain cases of ulcers of the stomach, arthritis, and heart trouble.

I believe also that pain in certain areas of the body can be relieved by producing in this area sensations correlated with musical numbers. The process by which relief is produced is believed to be one similar to that of massages, and other physical therapeutic methods.

In the case of psychotherapy it is often essential to convince the patent of the propriety of following certain rules of conduct. It is proposed to inculcate these rules in the patient by repetition of a message through a recorder and by punctuating and emphasizing the message by means of correlated sensations. In this way a double form of therapy is being performed on the patient, one through the correlated sensations, and one through the message with considerable saving of the therapist time.

The general object of the invention is to provide a patient with satisfaction by proper performance of a simple mental operation, and relieve pain by causing the patient to experience in proper areas certain sensations correlated with a musical number.

A further object is to provide means for subjecting a

person to physical sensations to accentuate, punctuate or emphasize a message being delivered to him.

Other objects are to utilize musical therapy in conjunction with electro or physical therapy, and to provide apparatus to produce sensations correlated with music.

Yet another object is to provide apparatus permitting the recording of sound and a shocking signal and reproducing the two in the same relation as originally recorded.

A still further object of the invention is to provide a multi-electrode applicator for contacting a person with all electrodes exerting an equal pressure on the person.

Still another object is to provide recordings of musical numbers, or of messages, combined with recorded signals, which records when used with the apparatus of the invention will cause the patient to hear the music or the message and experience the sensations in pre-arranged correlation.

Another object of the invention is to provide a therapy for treatment of mental or physical disturbances that is so safe that it can be used by persons in their homes without constant attention of a trained therapist, that can be performed by relatively inexpensive uncomplicated apparatus, and that can be repeated many times without annoyance to the person being treated.

In the accompanying drawings:

Fig. 1 is a diagrammatic example of apparatus in which the intensity of the shocking sensation depends on the loudness of the sound;

Fig. 2 illustrates diagrammatically apparatus for recording simultaneously a sound and a shocking signal;

Fig. 3 illustrates diagrammatically apparatus for playing back records on which sound and shocking signals have been simultaneously recorded;

Fig. 4 is a perspective view, partially broken away and shown in section, of apparatus for use in the practice of the invention for creating physical shocking impulses in desired sequence with each other;

Fig. 5 is a circuit diagram of one type of apparatus for use in the reproducing of correlated shocking impulses and sound;

Fig. 6 is an illustration of a circuit diagram of recording and reproducing apparatus for both sound and shocking signals, the two signals being recorded on the same track;

Fig. 7 is an illustration of a circuit diagram for recording and reproducing sound and shocking signals, the two signals being recorded on separate tracks;

Fig. 8 is a perspective view of yet another type of shock producing means for use in the practice of the invention; and

Fig. 9 is a section and electrical connection diagram of another type of shock producing means for use in the practice of the invention.

The present invention relates to a method of producing music and correlated shocking impulses, comprising the steps of simultaneously recording a musical or other selection and shocking signals upon a common medium and with the shocking signals being of an inaudible frequency range, creating electrical impulses corresponding to the recorded selection and the shocking signals, separating the electrical impulses for the selection from the electrical impulses for the shocking signals, recreating the selections from the electrical impulses corresponding thereto, and creating shocking impulses from the electrical impulses of the shocking signals. Likewise, the invention relates to apparatus for producing localized rhythmic sensations on the surface of the skin of a person, which means includes a member actuated by the shocking impulses, a plurality of electrodes, and means

for shifting the shocking impulses from electrode to electrode in a predetermined, logical sequence.

In practicing the method of the invention, substantially conventional apparatus can be used for recording the selection, usually musical, and the shocking impulses to be correlated therewith, and likewise conventional reproducer means can be used to recreate electric waves from the recorded data. Usually volume control means, amplifier means and reproducer, or applicator and speaker means are also provided in the reproducing circuit to create the desired shocking action in correlation with the reproduction of the recorded selection.

With reference to the details of the embodiments of the invention shown in the drawings, Fig. 1 shows a block diagram in which a transducer such as a phonograph pick-up creates an electrical signal that is fed to two amplifying channels including a conventional audio channel the output of which feeds a loud speaker and to a shocking channel the output of which is applied to the body. The electrical reproducer may be a phonograph, a tape reproducer, or any other type of similar equipment and it has electronic amplification provided for the signals. The output of the shocking channel should not be less than fifty (50) volts and preferably 100–200 volts with an internal impedance sufficiently high to limit its current to a safe value of not more than 20 ma. The apparatus is used with a recorded selection which may comprise a musical selection with shocking impulses being experienced therewith when the music is of a desired intensity. The reproducer **1** is connected to an audio channel which amplifies the signal provided thereto by means of a conventional amplifier **2** connected in such circuit, while a suitable volume control **3** is also present in the music circuit to control the signal volume, and the resultant signal is transmitted to a speaker **4**, or similar member to recreate the musical selection or other number originally recorded. Similarly, an amplifier **5** is provided in the shocking circuit and its output in turn is controlled by a volume control **6** in the circuit so that a shocking signal, as desired, is provided to an applicator indicated as a whole by the numeral **7**. This applicator **7** can be of any desired type, examples of which are described in more detail hereinafter.

Of course, the reproducer **1** may be supplied with a selection which only comprises a shocking signal of any desired pattern which would not have any correlated selection simultaneously recorded therewith.

Whereas the amplification of sounds and the producing of shocking signals as a function of sound intensity produces correlated sensations in accordance with the present invention, I believe that better results are obtained when the shocking signals are recorded as a separate although possibly simultaneous process with the recordings of the music. Such signal may be recorded by tapping a switch in rhythm with the music. Such signal is then independent of the loudness of the music; sharp rhythmic signals can be produced even though the music may be of steady loudness, without a background of uncorrelated shock between meaningful shocks. Figures 2 and 3 show diagrammatically equipment for this type of therapy.

In the apparatus shown in Fig. 2, a microphone **8** can be used for picking up a desired musical selection and it produces electrical impulses corresponding to the sound vibration. The microphone connects to a signal mixing unit **9** to which also is connected a key **10** to provide an alternating current signal. Usually a volume control **11** also is present in the circuit of the key **10** for regulating the volume of the shocking signal that likewise is carried to the mixer for recording on a conventional recorder **12** with the musical selection simultaneously being picked up by the microphone **8**. The signal from the key **10** should be of frequency outside the range of the music. For instance, the frequency of the music may be cut off at 6000 C. P. S. and the shocking signal may be at 8500 C. P. S.

When it is desired to use a recorded number, such as one prepared by use of the apparatus shown in Fig. 2, then a reproducer **13**, Fig. 3, can be used to play back the recorded selection and the mixed signal therefrom is fed to a suitable filter unit **14** that will separate the shocking impulses or signals from the audio impulses or signals. In each instance, the separated signal is fed to a conventional amplifier unit and volume control unit for recreation of the original sound or shock waves. Such recreated signals then can be transmitted to an applicator unit **15**, as described hereinafter, or a speaker **16**, respectively, for recreation of the original signals. Thus a shocking signal can be provided in correlated time sequence to the beat of a musical selection.

In Fig. 4, there is shown one type of an applicator for producing a progressive series of shocking impulses on the skin of the person being treated. This applicator is shown as comprising a frame **20** of substantially hat shape, and it has a cover plate or layer **21** over the open lower surface thereof. Both the frame **20** and cover **21** have a circumferentially spaced annular series of aligned holes provided therein in which a plurality of electrodes **22** are individually positioned. These electrodes **22** have heads **23** usually provided on the inner ends thereof and pointed ends **24** of the electrodes protrude through the cover **21** for contacting the skin surface of the person being treated.

In order to transmit the desired shocking impulses to the series of electrodes **22**, the shocking impulses are provided to the electrodes **22** by means of a commutator contact **25** carried by a shaft **26** journalled on the frame **20**. Such shaft **26** is driven by means of an electric motor **27** supplied with electrical energy through power supply leads **28** and **29**. The motor **27** is connected to the shaft **26** by gears **30** and **31** carried by the shaft **26** and the output shaft of the motor **27**, respectively. A conventional brush or slide contact transmits the shocking impulses from a supply wire **32** that extends to and connects to any suitable reproducer circuit for providing the electrical shocking signals of the desired amplitude from the supply means, such as were briefly described hereinbefore. An enclosure member **33** may be carrier by the frame **22** and cover all exposed portions of the mechanism that are shown as supported on the outer surface of the frame **20** so that the patient cannot see any of the working parts of the treatment apparatus. Any desired handle **34** may be provided for the assembled apparatus of the invention to facilitate handling the apparatus and application of the apparatus to a patient. The shocking circuit is completed by use of a conventional hand electrode, for example, which connects to the reproducer circuit and which would be held by the patient as he is being treated.

It is important that the electrodes **22** each contact the skin surface of the patient with an equal weight and suitable means, such as friction bushings, slidably secure the electrode to the cover **20**, or **20** and **21** so that the electrodes function in this manner.

Fig. 5 shows one typical circuit diagram for devices for producing shocking sensations from high frequency signals and audio signals from a recording as referred to hereinbefore. The mixed audio and shocking signals are regenerated or created in a conventional pick up **40**, which electrical signals pass through a suitable volume control **41** and are amplified by passing through suitable vacuum tube circuits **42** and **43**. A resistance **44** and a condenser **45** are connected in the audio circuit for attenuating all high frequencies and which will not pass the shocking signal at a sufficient level that it can be heard in the speaker connected to such circuit. A suitable transducer, such as a speaker **46**, is connected to the amplified audio circuit for recreating the originally recorded selections. Simultaneously, the signal generated

in the pick up 40 is transmitted through a condenser 47 which attenuates all lower frequencies and passes the shocking signal more freely. Next the signal across the resistance 48 passes through two stages of tuned amplification at the shocking frequency. This tuning is provided by network stages 49 and 50 each of which has a reactance and a condenser connected in parallel and having a resonating frequency corresponding to the shocking signal frequency. Thus the network will function so as to exclude all signals except that in a narrow range at about shocking signal frequency. The output of the last stage is fed to a step-up transformer 51 that steps up the voltage output and isolates the D. C. B battery supply supply voltage from the patient. As a further safety precaution, two condensers 52 and 53 are inserted in the output circuit to provide extremely high impedance for the power frequency should power potential be accidentally applied to the primary side of the transformer 51. Output circuit terminals 54 connect to the condensers 52 and 53 and would be used to connect to suitable applicator means, such as those shown in Fig. 4.

A circuit, such as shown in Fig. 5, may use recorded selections in the forms of tape, or conventional plastic or wax records, etc., in which the shocking signal has been recorded simultaneously with the audio signal. It will also be appreciated that in some instances the audio signal may be absent entirely and that such signal may comprise either music, a speaking voice, or be of any other desired nature. Of course, the audio and shocking signals may be recorded on separate tracks or records, if desired.

Fig. 6 shows diagrammatically an arrangement for either home use by the patient himself or by a therapist and the apparatus is suitable for both treatment by, and for recording of, an audio signal simultaneously with a shocking signal. This device, for example, may use a tape recorder. It will be seen that the shocking circuit is very similar to that described with reference to Fig. 5, and that the audio reproducing circuit is quite similar to the circuit connected to the volume control 41 of the circuit shown in Fig. 5. In this instance, a microphone 60, a recorder 61, a conventional play back pick up 62 and a speaker 63 are provided. A tandem switch 64 is adapted to connect either the microphone 60 and recorder 61 in the circuit, or else to connect the pick up 62 and speaker 63 in such circuit. An amplifier circuit indicated at 65 is provided and is similar to the amplification circuit including the tubes 42 and 43 of the circuit shown in Fig. 5. The shocking circuit in Fig. 6 is very similar to that shown in Fig. 5 but one difference is that a control switch 66 is provided for feeding back from the output of the second amplification stage of the shocking circuit to the input of the first stage through such switch so that the circuit will oscillate at the same frequency as it is designed to pass. The amount of feedback can be adjusted by a volume control 67 provided in such shocking circuit. A step down transformer 68 is connected to the output of a shocking transformer 69 and the low voltage output of such step down transformer 68 is fed through a high resistance 70 and a condenser 71 to the second stage of the recording amplifier 65 by closing key 73.

Fig. 7 shows a tape 75 which has a sound signal recorded on one sound track thereof while a rhythmic signal is recorded on a second sound track thereon. Reproducing heads 76 and 77 are individually operatively connected to the different sound tracks of the tape 75 and connect to an audio amplifier circuit 78 and sound reproducer 79, and to an amplifier 72 and a body applicator 74, respectively.

Fig. 8 shows another type of applicator for supporting a plurality of electrodes to be positioned in contact with different areas of the skin surface of the patient. For example, a table 80 is shown and it has a plurality of electrodes 81 resiliently carried thereby in suitable positions to agree with the periphery of the human body. Thus a person lying on a table can have large surface areas contacted with different ones of the electrodes 81. For example, light springs (not shown) can be individually associated with the electrodes 81 for urging them up into a position protruding above the surface of the table 80. The shocking signals are applied to the electrodes 81 by means, such as leads 82, that extend from a commutator device 83 carried by the table 80 on the lower surface thereof. The commutator 83 may be driven in any conventional manner, as by an electric motor (not shown) which has a power supply provided therefore by a lead 84. The shocking signals may be applied to the commutator 83 by means of a lead 85 so that as the commutator 83 is rotated it will progressively transmit the shocking signals to the different electrodes 81 and progressively apply such shocking signals to changing portions of the patient's body in a progressive manner around the periphery of the patient's body in the areas contacted by the electrodes 81.

In some instances, it may be desired to provide a mechanical shocking sensation instead of an electrical pricking sensation and apparatus of such type is shown in Fig. 9. Thus the output of the shocking circuits referred to hereinbefore may be connected to and rectified in a conventional rectifier 90 that is connected to a control transformer 91. The output from the rectifier 90 is transmitted to a member, such as an electro-magnet 92, which positions a solenoid plunger 93 therein. Normally a spring 94 is engaged between a head portion of the solenoid plunger 93 and a portion of the case of the electromagnet 92 to permit gravity to position such plunger 93 in a resilient retracted position. However, when the electromagnet 92 is energized, the solenoid 93 is drawn farther into the electromagnet to extend farther above the table, like the table 80, for example, in order to produce a mechanical shocking impulse on the patient because of the shocking signal recreated in the apparatus of the invention.

It will be understood that the shocking currents must be limited to safe values by the impedance of the applicator circuit, rather than by the resistance of the body. This is because of the highly variable resistance of the human body and usually the impedance of the circuit and the shocking voltage should be adjustable. A voltage output of up to 220 volts and an impedance of from 50,000 to 300,000 ohms is desirable to prevent any dangerous current in the body and to allow satisfactory adjustment of the shocking circuit. Usually the electrodes used in practice of the invention should be of a diameter not more than 1/16 of an inch and the shocking impulse should be of very short duration. As is indicated, a very light shocking current is used so that irritation of the skin is avoided.

In some instances, the amount of shock produced may be proportional to and increase with the volume or intensity of the correlated sound waves. The invention, it will be understood, also relates to the recording of the correlated music and shocking signals on a tape, wire, wax record or the like.

A message recorded or reproduced in practice of the invention may be a musical selection, a story, a talk or other selection, as desired.

It should be realized that the shocking sensations used in practice of the invention may be a mechanical action, or it may be an electric signal applied to the body.

While several complete embodiments of the invention have been disclosed herein, it will be appreciated that modification of these particular embodiments of the invention may be resorted to without departing from the scope of the invention as defined in the appended claims.

I claim:

1. Apparatus for applying localized rhythmic therapeutic sensations on the body of a person comprising a member having simultaneously recorded music and elec-

tric impulses thereon, said music impulses being at frequencies below about 6,000 cycles per second, and said electric impulses being above 6,000 cycles per second, means for obtaining electrical impulses from the member to correspond to the original music impulses and electric impulses, filter means for separating the music impulses and the electric impulses, means for obtaining music from the music impulses, means for obtaining electric impulses from the electric impulses, and an applicator for applying the said electric impulses to the body of a person.

2. Apparatus for applying therapeutic shocks on the human body comprising a plurality of conductive members for application to spaced body portions, a record having a rhythmic pattern stored thereon, means for transforming the record of the rhythmic pattern to a corresponding electrical rhythm, and means for conducting the pattern to said conductive members and for commutating potential from one of said conductive members to another so that sensations experienced by the person are determined both by the pattern of rhythm and by the commutating of the conductor members.

3. A shock applying apparatus for contact with the skin surface of a person and comprising a carrier frame, a plurality of electrodes slidably carried by said frame and extending therefrom for contact with the skin surface of a person to support the apparatus thereon, an

electric motor positioned within said frame, electrical energy supply means, a contact member journalled on said frame for transmitting electrical energy to said electrodes, and means connecting said motor to said contact member for rotating said contact member.

4. Apparatus for applying localized therapeutic sensations on the human body including a reproducing device, a recording having both sound and a correlated electric signal thereon of a frequency greater than that of audible sound, the electric signal and the sound being separated in frequency, filter means for separating the sound from the electric signal, separate amplification means for both the sound and the electric signal, an applicator to transmit the shocking electric signal to the human body, and a speaker for reproducing the sound.

References Cited in the file of this patent

UNITED STATES PATENTS

750,584	Brown	Jan. 26, 1904
1,680,086	Carlson	Aug. 7, 1928
2,368,207	Eaton	Jan. 30, 1945
2,624,342	Di Perna	Jan. 6, 1953

FOREIGN PATENTS

387,518	Great Britain	Feb. 9, 1933
405,912	Great Britain	Feb. 15, 1934