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Lock

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[45] **Aug. 19, 1975**

[54] **ELECTRONIC ACUPUNCTURE DEVICE**

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[51] **Int. Cl.**[2]..... **A61B 5/05;** A61N 1/32

[58] **Field of Search**..... 128/2.1 C, 2.1 R, 422, 128/421, 420, 419 R, 409, 329 A, 416, 303.18

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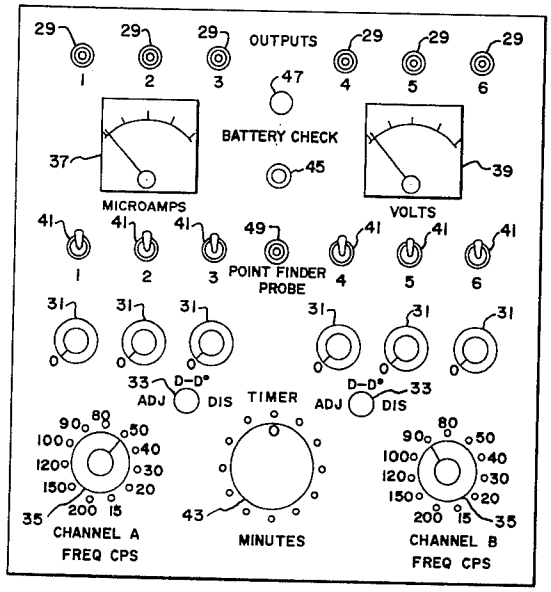
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Primary Examiner—Richard A. Gaudet
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Attorney, Agent, or Firm—Bruce & Mc Coy

[57] **ABSTRACT**

An electronic acupuncture device comprised of an a.c. signal generator transformer coupled to a multiplicity of output jacks having at least one pair of probes with a plug for engaging any one of said output jacks, and means for selecting between different waveshapes and frequencies and for separately adjusting and measuring the signal level at each output jack. A timer is provided for automatically turning off the signal generator after a preset therapy time.

5 Claims, 7 Drawing Figures



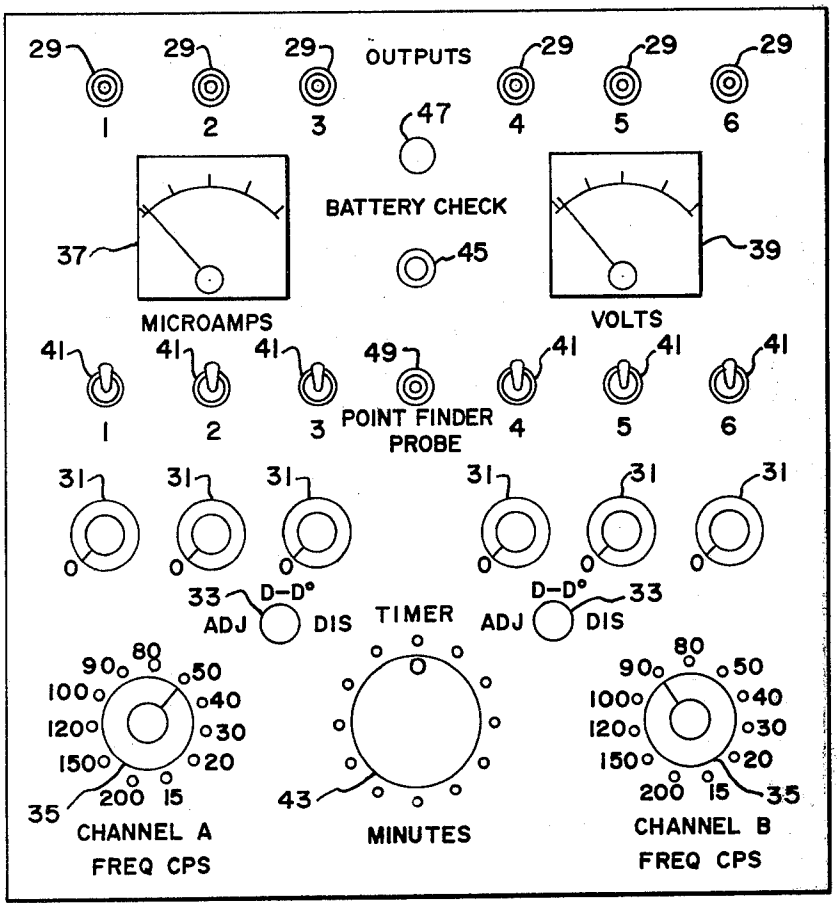

OUTPUTS
BATTERY CHECK
MICROAMPS
VOLTS
POINT FINDER PROBE
D-D°
ADJ
DIS
TIMER
CHANNEL A FREQ CPS
MINUTES
CHANNEL B FREQ CPS

FIG.—2

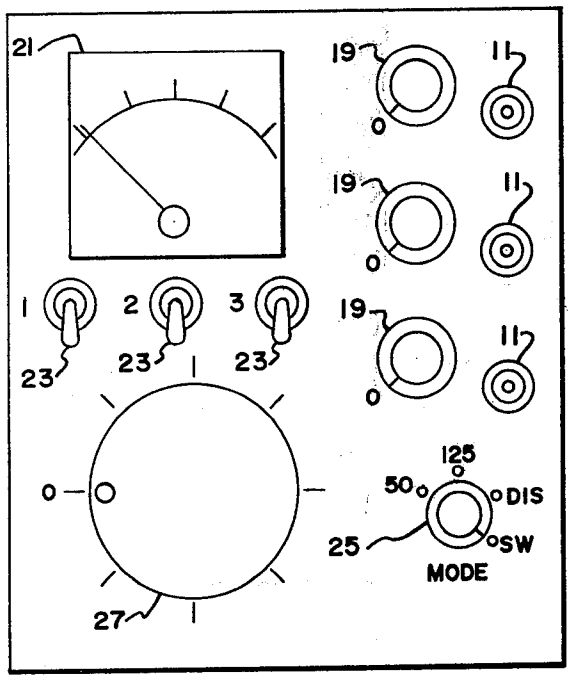

MODE
DIS
SW

FIG.—1

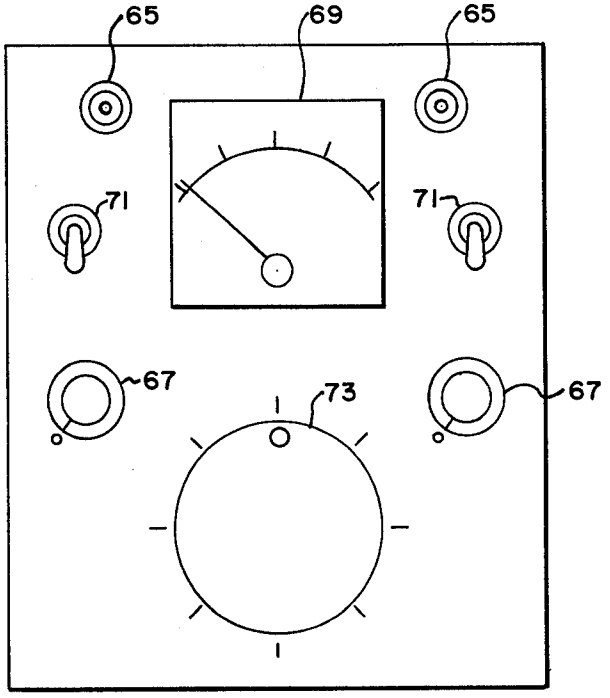


FIG.—3

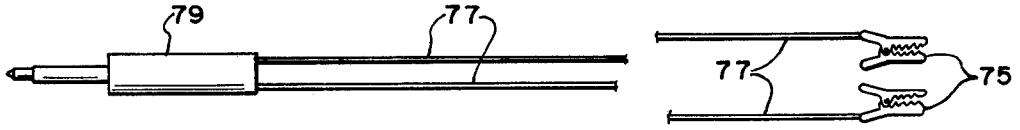


FIG.—5

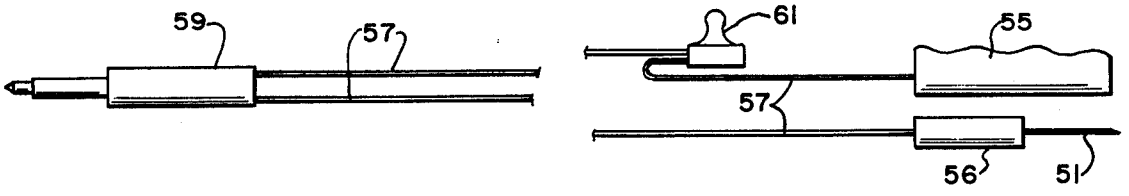


FIG.—4

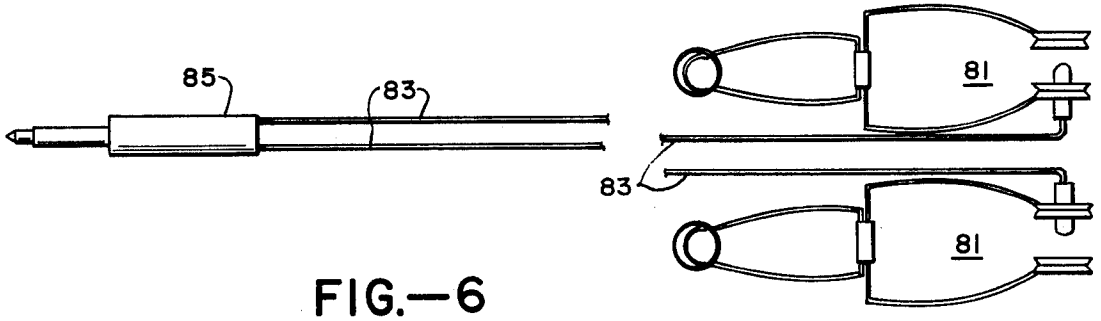


FIG.—6

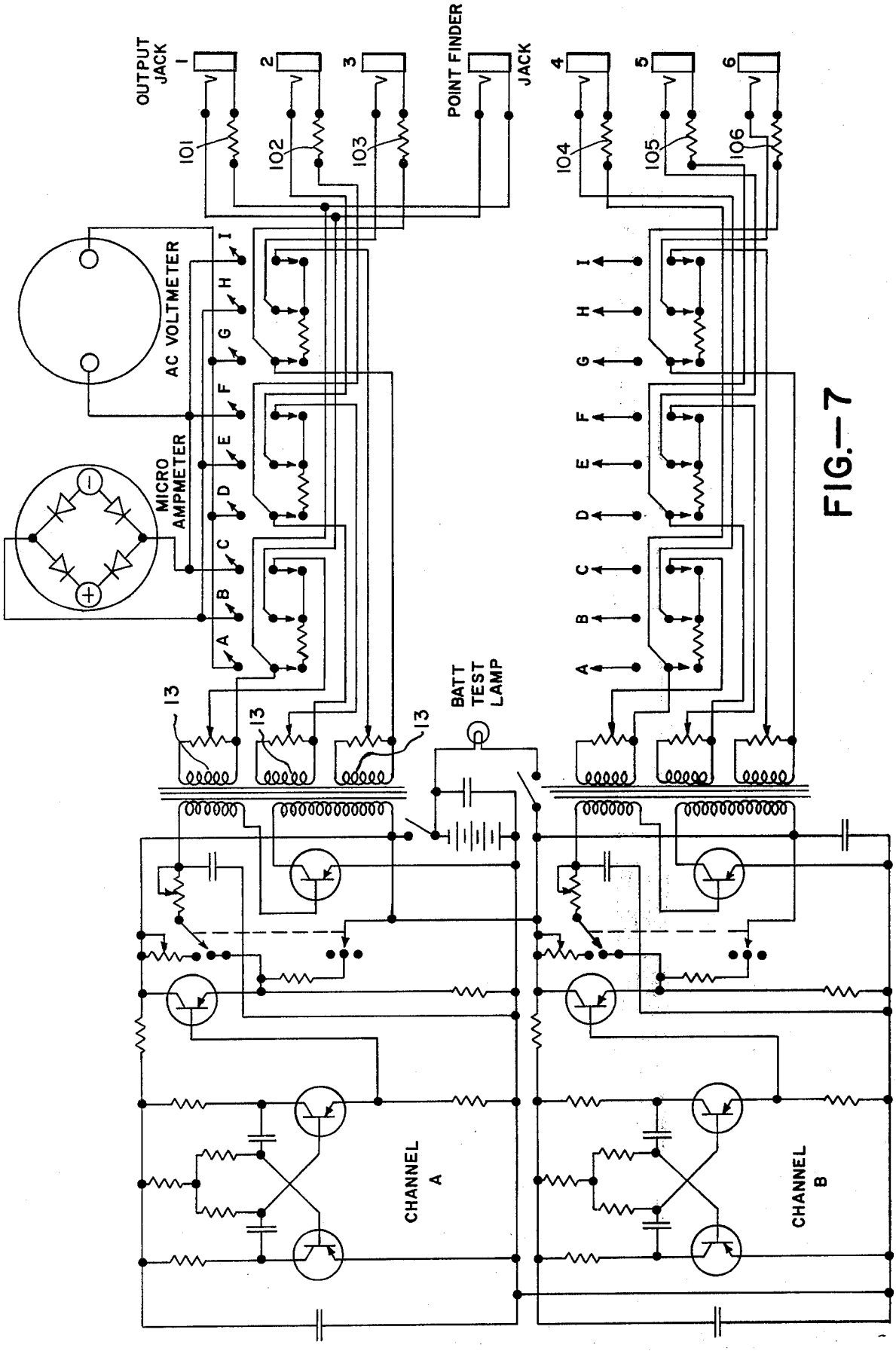

OUTPUT JACK
1
2
3
POINT FINDER JACK
4
5
6
101
102
103
104
105
106
AC VOLTMETER
MICRO AMPMETER
A
B
C
D
E
F
G
H
I
13
BATT TEST LAMP
CHANNEL A
CHANNEL B

FIG.—7

ELECTRONIC ACUPUNCTURE DEVICE

BACKGROUND OF INVENTION

1. Field of Invention

The present invention relates to devices used in acupuncture treatment and more particularly to electronic acupuncture devices for locating acupuncture points and for supplying an electrical current to such points.

2. Description of the Prior Art

The science of acupuncture has been practiced in China for many centuries. However, only recently has it attracted the interest in the western world, and thus only recently has it been exposed to the scientific methods of the west.

As originally practiced, acupuncture treatment requires that acupuncture needles be inserted into the patient's skin at very precise points, called acupuncture points, for stimulating certain nerve lines called meridians. Different symptoms can be treated by selectively stimulating different acupuncture points.

It is known that the Chinese have used electricity as a means of stimulation, however, little is known about the early Chinese electrical stimulators since there appears to be no publications on the subject, and it has been extremely difficult to take the devices out of China. However, from the limited information available, mainly from visitors to and from that country, it is known that the Chinese electrical devices are crudely made devices which primarily use d.c. current and which also tend to shock the patient. Moreover, because of the Chinese intuitive approach to acupuncture treatment, no metering systems have ever been used in conjunction with their equipment.

With the nascent interest in acupuncture treatment in the west, a few electronic devices have appeared in western markets. These devices, however, have the disadvantage of generating either a d.c. signal like the Chinese devices or an a.c. signal to two or more probes having a common ground. The consequences of these designs is that they tend to cause discomfort to the patient due to electrical surges or shocks and in the case of the d.c. devices are therapeutically less effective.

The present invention overcomes these problems by providing an electronic acupuncture device which supplies an a.c. current to separate probe pairs which are electrically isolated one from the other.

To achieve the capability of simultaneously introducing current along several meridians in a patient's body while using only one device and without shocking the patient practioners have electrically connected meridians in series by suitably connecting wires between needles inserted at various acupuncture points. A voltage is then impressed across the series connection. The disadvantage of this technique, however, is that there is a loss of power to each meridian because the available voltage from the electrical unit divides itself across the meridians thereby reducing the available current. Such a reduction in current sharply reduces the effectiveness of the treatment. The present invention obviates this problem by providing separate probe pairs for each pair of needles.

Another disadvantage of prior art devices is that no means is provided for measuring the parameters of the electrical signal, such as current and voltage, which is supplied to the probes. This capability is important because of the need of western researchers to record and compile data for scientific evaluation. To overcome the inconvenience and expense of having to measure signal parameters using separate meters the present invention provides an electronic acupuncture device having easily viewed meters built into the control panel which can be activated to individually measure the signal to each of a multiple of probe pairs.

SUMMARY OF THE INVENTION

The present invention is an electronic acupuncture device for use in acupuncture research. It is comprised of an a.c. signal generator with a multiple of output jacks transformer coupled to the output of the signal generator. Probe pairs are provided each having a plug for engaging one of the output jacks. Also provided is a means for separately adjusting and measuring the signal level to each probe pair, a means for selecting between different signal shapes and frequencies and a timer for automatically turning off the signal supplied to the output jacks after a preset therapy time.

OBJECTS OF INVENTION

It is therefore an important object of the present invention to provide an electronic acupuncture device which is portable and can be easily operated.

It is another object of the present invention to provide electronic acupuncture device which has multiple outputs such that more than one pair of probes can be used at the same time.

It is a further object of the present invention to provide an electronic acupuncture device which will supply an a.c. signal to more than one pair of probes without causing discomfort to the patient due to electrical shock.

It is still another object of the present invention to provide an electronic acupuncture device which includes a means for conveniently measuring the signal parameters at each output jack.

It is still a further object of the present invention to provide an electronic acupuncture device which can supply a.c. signals of different frequencies and waveshapes.

It is yet another object of the present invention to provide an electronic acupuncture device where the level of the signal supplied to each output jack can be independently adjusted.

It is yet a further object of the present invention to provide an electronic acupuncture device which can be automatically turned off after a preset treatment time.

And yet another object of the present invention is to provide an electronic acupuncture device which includes a means for quickly and easily locating the desired acupuncture points on a patient's body.

Other objects of the invention will become apparent when it is considered in its preferred forms as disclosed in the accompaning drawings and as described in the following description of the preferred embodiment.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front elevational view of the control panel of one embodiment of the present invention;

FIG. 2 is a front elevational view of the control panel of a second embodiment of the present invention;

FIG. 3 is a front elevational view of the control panel of a third embodiment of the present invention;

FIG. 4 is a partial side elevational view of the point finder probe showing the earplug connected in series to the grip electrode;

FIG. 5 is a partial side elevational view of the probes having alligator clips as electrodes;

FIG. 6 is a partial side elevational view of the probes having earclip electrodes; and

FIG. 7 is a schematic diagram of the circuit employed in the embodiment shown in FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

References made to the drawings are to the details of the present invention in its preferred forms. The present invention provides a novel electronic acupuncture device which is particularly useful in acupuncture research where flexibility in the parameters of the electronic signal, such as current and voltage level and frequency, and a convenient way of measuring these parameters are important. It comprises a single portable unit having an adjustable signal source and a number of probe attachments. The probe attachments have electrodes formed so that they can be attached to acupuncture needle pairs inserted into the patient's skin or alternatively clipped directly to the body of the patient. As the patient is being treated, the parameters of the signal supplied to the acupuncture needles can be measured by means such as a microammeter or a voltmeter, or both, which are mounted for easy viewing on the unit's control panel.

Referring now to the drawings, FIGS. 1–3 show the front control panel of the present invention in its preferred embodiments. Each embodiment includes a means for generating an a.c. signal, the circuitry for which is located behind the control panel. For economy of size and weight, solid state components are used in the signal generator circuits and standard dry cell batteries can be used as the power source.

FIG. 1 shows the control panel of one embodiment having three output jacks **11.** Probe pairs such as are shown in FIGS. **5** and **6** are provided for engagement with the output jacks whereby the signal generated by the signal generating circuit is transmitted simultaneously to each probe pair. Though the embodiment shown in FIG. 1 has three output jacks for accomodating three probe pairs, either a greater or lesser number of output jacks can be provided.

Output jacks **11** are transformer coupled to the signal generating circuit, such as can be seen in the circuit diagram in FIG. 7. Although the circuit diagram shown in FIG. 7 is representative of the circuit of the embodiment shown in FIG. 2 of the drawings, the transformer coupling shown therein is common to the model shown in FIGS. 1 and 3 as well. The transformer has a separate secondary winding **13** for each output jack such that no common ground exists, or in other words, such that each probe pair circuit is isolated one from the other. By providing such a transformer configuration, the possibility of shocking a patient during treatment when using more than one pair of acupuncture needles is sharply reduced or eliminated.

Returning now to the control panel of FIG. 1, a means for adjusting the signal level is provided for each output jack. This adjustment means comprises three rotatable knobs **19** mounted on the control panel. By turning the adjustment knobs, the signal level can be separately adjusted for each output jack from a zero signal level to the level desired for acupuncture treatment.

A means for measuring the signal level at the probes, such as microammeter **21,** is provided for setting and measuring the parameters of the signal used in the acupuncture treatment. The microammeter **21** is activated to measure the current at a particular probe by switching the appropriate meter activating switch **23.** By switching the desired activation switch, the meter is placed into the output circuit of the output jack engaged with the probe being measured thereby measuring the current running therethrough. In this manner, one meter can be used for measuring the current through any one of the several probes. Toggle switches are preferably used as activation switches **23.** However, other types of switches can be used.

A mode adjustment switch **25** is included for varying the frequency or the shape of the electronic signal. This adjustment switch is located on the control panel which can be turned to select between regular sinusoidal signals of different frequencies, or alternatively, to select a signal having an irregular dense and disperse feature, or a square wave signal. The dense and disperse signal, denoted as D-D° on the control panel, is characterized by a burst of alternating current followed by a relatively quiet period followed by another burst of alternating current in a repeating fashion. Only one mode switch is provided for selecting the signal type to all of the output jacks.

A timer **27** is provided in the form of a knob on the front of the control panel which can be turned to select a present operation time. The timer serves as an on/off switch. After the preset operation time has elapsed the timer automatically turns off the power. If the physician does not wish to preset the operation time, the timer knob can be switched to a hold position whereby the timing mechanism is disengaged. In the preferred embodiment this can be done by turning the timer switch fully clockwise to disengage the timing mechanism.

FIG. 2 of the drawings refers to a second embodiment of the present invention. This embodiment comprises two channels A and B each of which is powered by a separate a.c. signal generator. Three output jacks **29** are provided with each channel and are transformer coupled to the signal generating circuit in the same manner as described in the embodiment shown in FIG. 1 of the drawings. Because there are three output jacks for each channel and there are two channels, a total of six output jacks are available to the physician. Hence, six pair of probes, one for each output jack can be used.

A means for independently adjusting the signal level to each output jack of each channel is provided. The signal level adjustment means are in the form of knobs **31** vertically aligned beneath their respective output jacks for convenient reference. They can be individually rotated for varying the signal level of each output jack independent of the signal levels of the other output jacks.

Each channel also contains a mode adjustment switch **33** which in the preferred embodiment has three following positions: ADJ, for adjustable; D-D°, for dense and disperse; and DIS, for discontinue and repeat. A frequency adjustment knob **35** is provided which is activated when the mode adjustment means is placed in the ADJ position. When in the ADJ position, the signal generated has a regular sinusoidal shape the frequency of which can be adjusted between generally 5 and 200 Hz by adjusting the frequency control

switch. Other frequency ranges may be employed, however, much of present day acupuncture research involves exploring the effects of electronic stimulation using a.c. currents within the frequency range provided.

When the mode switch is placed in the position designated D-D°, a signal having the characteristic of repeating short bursts, as previously described, is generated, and when the mode switch is turned to the DIS position, a signal is generated which has a discontinuous nature and repeats itself at regular intervals. Thus, the mode adjusting means switch **33** can be used in conjunction with the frequency adjustment knob **35** to alter the characteristics of the signal supplied to the three output jacks of each channel in terms of frequency and signal shape. Because of the two channel feature of this embodiment of the present invention, signals with different frequencies or waveshapes can be used at the same time.

A means for separately measuring the signal level of the signal supplied to each output jack is provided. In its preferred form, this means includes microammeter **37** and voltmeter **39** both of which can be simultaneously switched into the output circuit of any one of the output jacks of either channel by switching a suitable activation switch such as one of the toggle switches **41.** For easy reference, the toggle switches are preferably aligned vertically below their respective output jacks and numbered **1** through **6.** When a toggle switch is activated, placing the meters into the output circuit of its corresponding output jack, the current through and the voltage potential across the probes engaged with that output jack is indicated respectively on the microammeter and voltmeter.

Common to both channels of the embodiment in FIG. **2** is a timer **43** which can be used to present the operation time. The timer automatically turns off the power to both channels. If the physician does not desire to preset the operation time, the timer can be used as an off/on switch by adjusting it to a hold position.

A means for testing the battery power supply for the signal generators of both channels is provided, and comprises a push button activation switch **45** and a battery test indicator light **47** placed for easy viewing. By pressing the activation button the indicator light illuminates if the battery is charged and will not illuminate if the battery needs replacing.

The embodiment in FIG. **2** also includes a means for locating the desired acupuncture points on a patient's body. This means comprises a point finder jack **49** located on the front control panel. This point finder jack is dissimilar to the output jacks described above, in that it has no current limiting resistors connected with the jack such as current limiting resistors **101, 102, 103,** 104, 105, 106 connected to output jacks **1** through **6.** It is used to engage a point finder probe shown in FIG. **4.** Referring to FIG. **4,** the point finger probe comprises two electrodes: A point finder electrode **51** and a grip electrode **55.** The point finder electrode is formed as a probe which can be passed over the patient's body for locating acupuncture points, and it has an insulated handle portion **56** so that a physician can hold it without loading the point finder circuit. The grip electrode is formed for gripping by the patient preferably in a shape which comfortably fits the patient's hand as is shown in FIG. **4.** The leads **57** of the point finder probe are connected at the ends opposite the electrodes by a plug **59** for engaging the point finder jack **49.**

Acupuncture points can be found by noting sharp movements in the readings of the meters on the control panel as the point finder electrode **51** is passed over the patient's skin. However, the means for locating the desired acupuncture points preferrably also includes a means for converting increases in current through the point finder probe into an audio signal. In the preferred embodiment, this audio conversion is effected by an earplug **61** which is connected in series with the grip electrode **55.** Such an earplug must be sensitive to the frequencies used in the acupuncture therapy. By placing this earplug in his ear and passing the point finder electrode over the patient's body, the physician can hear an increasing audio sound as the probe passes over an acupuncture point.

FIG. **3** of the drawings shows a smaller more portable version of the embodiments in FIGS. **1** and **2.** This unit comprises only two output jacks **65** and two corresponding signal level adjustment knobs **67.** A meter **69** for measuring the output current is provided and can be independently switched into the output circuit of either of the output jacks by activating one of the two meter activation switches and can also be used as an on/off switch by turning the timer to a hold position.

Referring to FIGS. **5** and **6,** two types or probes are provided which can engage the output jacks of the embodiments shown in FIGS. **1, 2** and **3.** The pair of probes shown in FIG. **5,** which would be the more commonly used, comprise two alligator electrodes **75** connected to a pair of lead wires **77.** The lead wires are joined at the ends opposite the alligator clip electrodes by a plug **79** which can engage any one of the output jacks **11, 29, 65** on the front panel of the acupuncture device to be used. The alligator clips engage the acupuncture needles which are inserted into the patient's skin. One pair of probes are used in conjunction with one pair of needles. By utilizing more than one pair of probes in conjunction with different output jacks, additional needle pairs can be used on the same patient or on different patients for additional treatment. Although alligator clips are called for in the preferred form, the electrode shape can assume any other form which is suitable for engaging acupuncture needles.

The probe pairs shown in FIG. **6** can be used in lieu of the probes shown in FIG. **5.** This second pair of probes comprises two earclip electrodes **81** formed for clipping to the patient's ears. The ear clip electrodes are attached to a pair of leads **83** joined at their opposite ends by a jack **85** for engaging any one of the output jacks **11, 29, 65** found on the control panel of any one of the above described embodiments of the invention. These ear clip leads are used by attaching the ear clip electrodes **81** to opposite ears of the patient and by generating a current between the electrodes.

Since the operation of the devices shown in FIGS. **1–3** are basically identical, only the operation of the device shown in FIG. **2** is described herein. To turn the power on, the timer switch **37** is turned counter-clockwise to the hold position. The signal level adjustment knobs **31** are then turned fully counter-clockwise to a zero signal level, and the six toggle switches **41** for activating the microammeter **37** and voltmeter **39** are switched to a normal or no reading position. The wave pattern desired for each channel is then selected by adjusting the mode switches to the ADJ, the D-D° or the

DIS position. If either mode switch is placed in the ADJ position, the corresponding frequency adjustment knob **35** must be set for the frequency desired. Care should be taken not to change the mode switch or the frequency adjustment switch during treatment, for this may produce an electrical shock which might cause discomfort to the patient.

Once the acupuncture device is preset as indicated above, the desired number of probes can be plugged into output jacks **29.** If the probes shown in FIG. **5** are used, one pair of probes is selected for use with each pair of acupuncture needles and are engaged with the needles by clipping the alligator clip electrodes **25** to the needles inserted into the patient's skin. Because of the two channel feature of the device shown in FIG. **2,** one pair of probes can be operated at one frequency or wave pattern, and another pair of probes engaged with an output jack of the other channel can be operated using a signal having another frequency or wave shape.

When the probes have been fixably clipped to suitable needle pairs, a signal is increasingly introduced at each pair of probes by turning the appropriate signal level adjustment knob **31** in a clockwise direction until the patient comfortably feels the current. Each probe pair should be adjusted separately in this manner.

When a suitable signal level is achieved the voltage crossed each probe pair, as well as the current through the probes, can be measured by activating the toggle switch **41** which is vertically below the output jack to which the probe pair to be measured is engaged. Only one toggle switch should be activated at a time, otherwise the meter reading will not be accurate due to loading of one pair of probes by the other. By individually activating the toggle switches, the voltage and current at each probe pair can be separately measured.

When the predetermined time set on the timer has expired, the power switch will automatically turn off. To use the timer manually, the timer knob is turned full counter-clockwise to the hold position.

The present invention provides a novel electronic acupuncture device which is useful in medical research for exploring the ancient Chinese art of acupuncture using electrical stimulation means. It is compact and has the versatility of being able to select between various signal levels, shapes, and frequencies. In addition, the present invention has the advantage of having meters which can monitor the signal being used during the acupuncture treatment. To prevent the danger of electrical shock to the patient, special transformers are provided and the patient is further protected by providing a timer for automatically turning off the acupuncture device after a preset operation time.

Although the present invention is described in considerable detail, it is not to be limited to such detail except as necessitated by the appended claims.

I claim:

1. An electronic acupuncture device for use in acupuncture research comprising

an a.c. signal generator and at least one transformer having a primary winding which is connected to the output of said signal generator and having a multiplicity of secondary windings,

a multiplicity of output jacks wherein each of said jacks is coupled to one of the secondary windings of said transformer,

at least one pair of probes having a common plug at one end and electrodes at the opposite ends thereof, said plug being releasably engaged with one of said output jacks, and said electrodes having means for fixably engaging acupuncture needles,

means for separately adjusting the signal level at each output jack,

means for selecting between signals having different waveshapes and frequencies,

means for individually measuring the signal level at each pair of probes whereby the parameters of the signal used in the acupuncture treatment can be measured and recorded,

a timer means for automatically turning off the signal from said signal generator after a preset operation time, and

means for locating before treatment the desired acupuncture points on the patient's body.

2. The electronic acupuncture device of claim **1** wherein the means for measuring the signal level includes a microammeter and voltmeter both of which can be externally switched into the output circuit of any one of said output jacks.

3. The electronic acupuncture device of claim **1** wherein said means for locating acupuncture points comprises

a point finder jack connected to one of the secondary windings of said transformer in parallel with one of said output jacks,

a point finder probe having a point finder electrode and a grip electrode, said point finder electrode having an electrically insulated handle portion, and said point finder probe having a plug which releasably engages said point finder jack, and

means for converting current through said point finder probe into an audio signal whereby, as the patient grips the grip electrode and the physician passes the probe electrode over an acupuncture point, the physician can hear an audio sound through said conversion means or can view sharp movements in the meter readings of said voltmeter and microammeter.

4. The electronic acupuncture device of claim **3** wherein the device includes a plurality of channels, each of said channels separately comprising

an a.c. signal generator and at least one transformer having a primary winding which is connected to the output of said signal generator and having a multiplicity of secondary windings,

a multiplicity of output jacks wherein each of said jacks is connected to one of the secondary windings of said transformer,

at least one pair of probes having a common plug at one end and electrodes at the opposite ends thereof, said plug being releasably engaged with one of said output jacks, and said electrodes having means for fixably engaging acupuncture needles,

means for separately adjusting the signal level to each output jack, and

means for selecting between signals having different waveshapes and frequencies whereby probes connected to different channels can be operated using signals having different shapes and frequencies.

5. An electronic acupuncture device for use in acupuncture research, comprising

A. a multiplicity of channels, each of said channels including:

i. an a.c. signal generator and at least one transformer having a primary winding which is con-

nected to the output of said signal generator and having a multiplicity of secondary windings,

ii. a multiplicity of output jacks wherein each of said jacks is connected to one of the secondary windings of said transformer,

iii. at least two pairs of probes having a common plug at one end and electrodes at the opposite ends thereof, said plug being releasably engaged with one of said output jacks, and said electrodes having means for fixably engaging acupuncture needles inserted in the patients's skin,

iv. means for separately adjusting the signal level at each output jack,

v. means for selecting between signals having different waveshapes and frequencies whereby probes connected to different channels can be operated using signals of different waveshapes and frequencies, and

B. a microammeter and voltmeter having external switch means for connection to any of said output jacks for individually measuring the voltage and current at each pair of probes whereby the voltage and current used in the acupuncture treatment can be measured and recorded,

C. a timer means for automatically turning off the signal from the signal generator after preset operation time,

D. a point finder jack connected to one of the secondary windings of the transformer of one of said channels in parallel with one of said output jacks,

E. a point finder probe having a point finder electrode and a grip electrode, said point finder electrode having an electrically insulated handle portion, and

F. an earplug connected in series to said grip electrode, one end of said earplug and point finder probe terminating at a common plug which releasably engages said point finder jack whereby, as the patient grips the grip electrode and the physician passes the probe electrode over an acupuncture point, the physician can hear an audio sound through said earplug.

* * * * *