United States Patent

MacLean

[15] **3,658,051**

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[54] METHOD OF TREATING LIVING THINGS USING HIGH INTENSITY PULSED MAGNETIC FIELD

[72] Inventor: **Kenneth Sheldon MacLean,** 135 East 65th Street, New York, N.Y. 10021

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[21] Appl. No.: **682,110**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 547,125, Mar. 21, 1966, abandoned, which is a continuation-in-part of Ser. No. 301,108, Aug. 9, 1963, abandoned, which is a continuation-in-part of Ser. No. 794,492, Feb. 20, 1959, abandoned.

[52] **U.S. Cl.** ..... **128/1.5,** 324/34 R

[51] **Int. Cl.** **A61b 17/52**

[58] **Field of Search** 128/1.5

[56] **References Cited**

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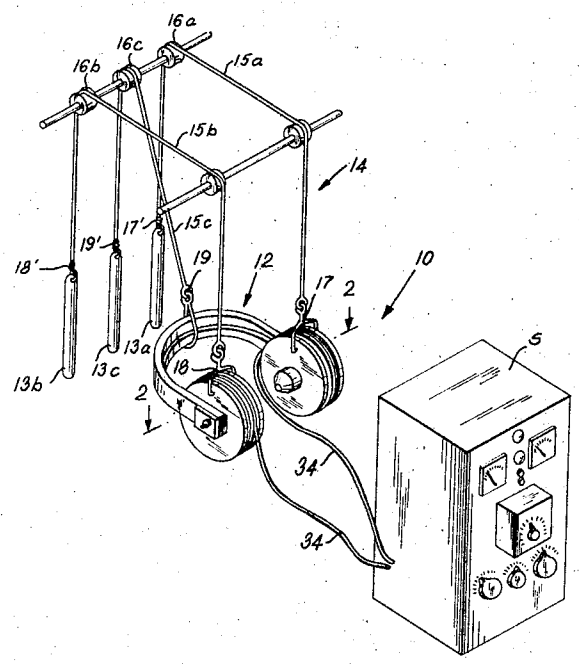
Primary Examiner—Delbert B. Lowe
Attorney—Breitenfeld & Levine

[57] **ABSTRACT**

A method of treatment including positioning the part of the patient or animal to be treated between the poles of an electromagnet. The part is then subjected to a pulsating magnetic field induced in the electromagnet by an intermittent direct current, the peak intensity of each pulse being at least 2,000 gauss. Preferably each pulse has a duration of at least ¼ second, and about one pulse per ½ second is administered.

4 Claims, 9 Drawing Figures



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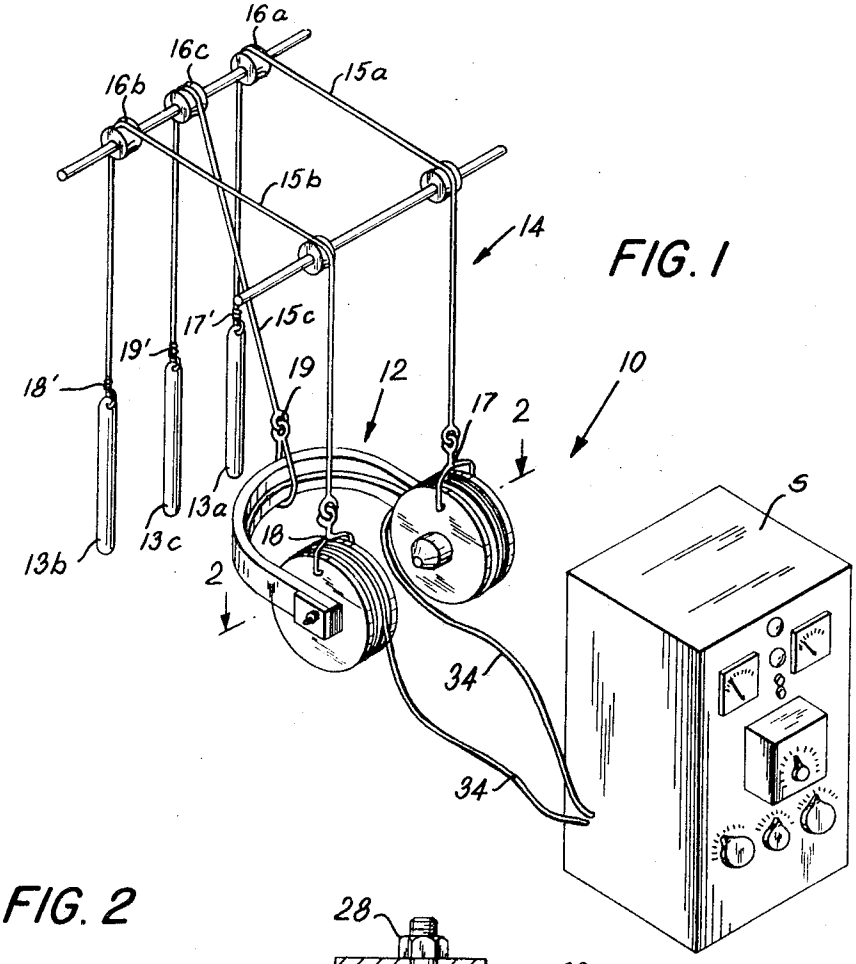
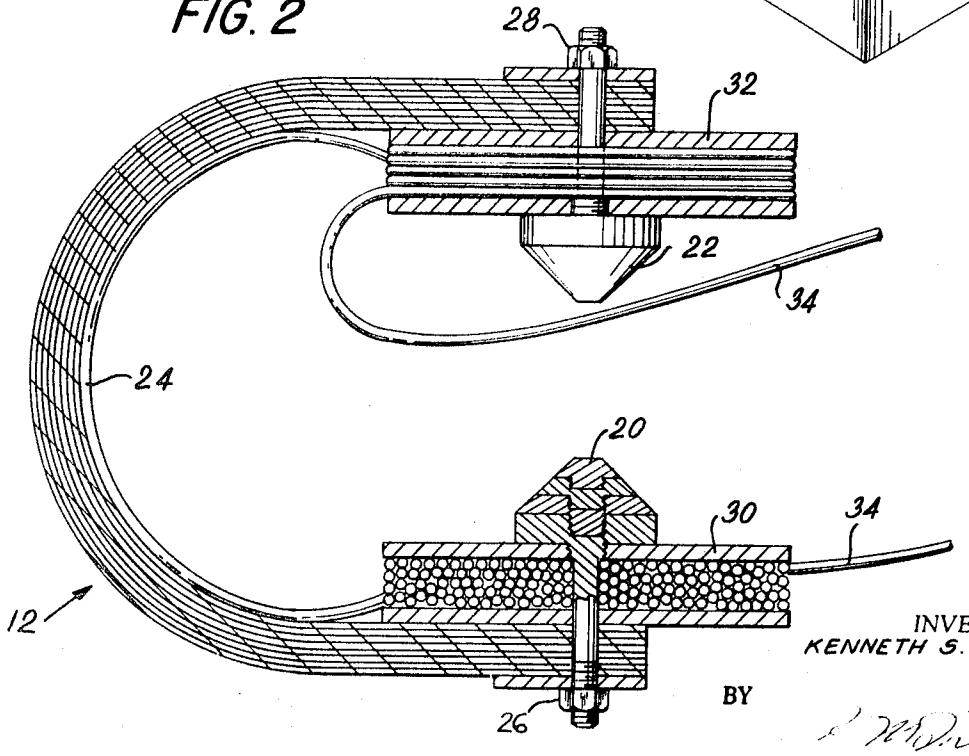


FIG. 1

FIG. 2



INVENTOR.
KENNETH S. MAC LEAN

BY

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FIG. 3

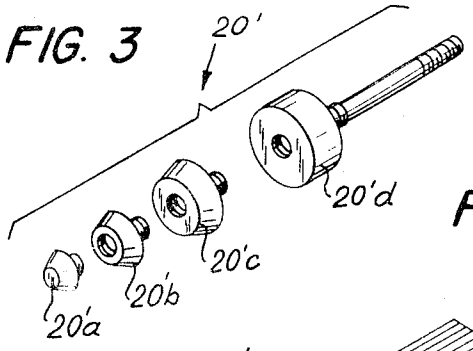


FIG. 4

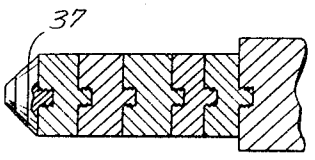
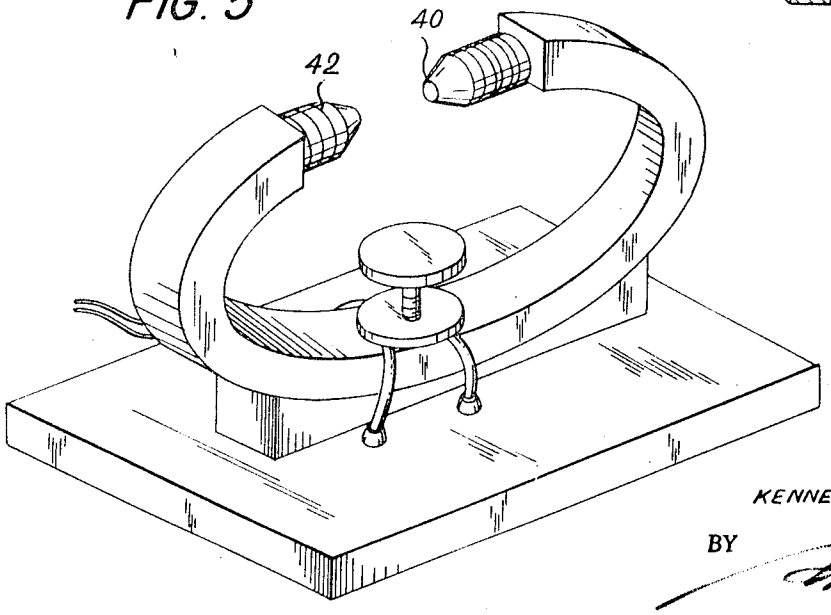


FIG. 6

FIG. 5

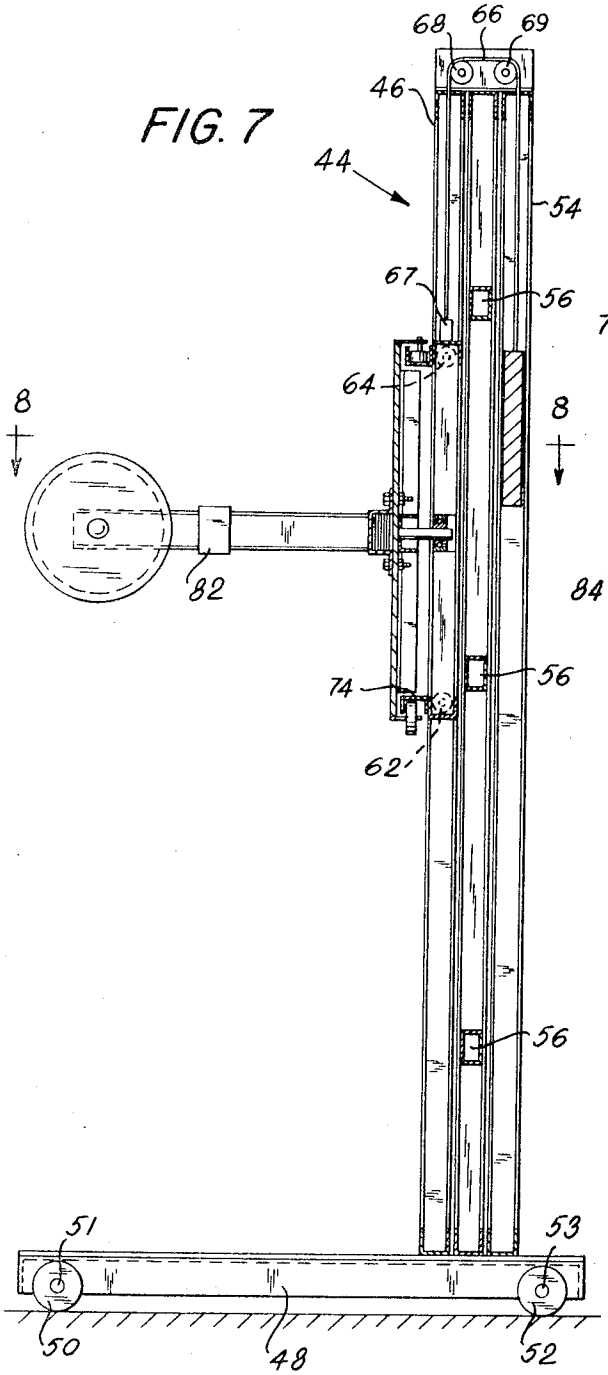


INVENTOR.
KENNETH S. MAC LEAN

BY

ATTORNEYS

FIG. 7



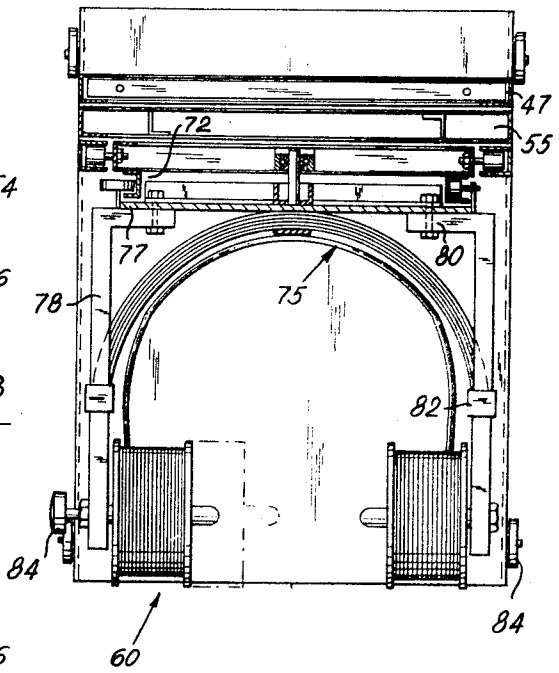


FIG. 8

INVENTOR.
KENNETH S. MAC LEAN

BY

ATTORNEYS

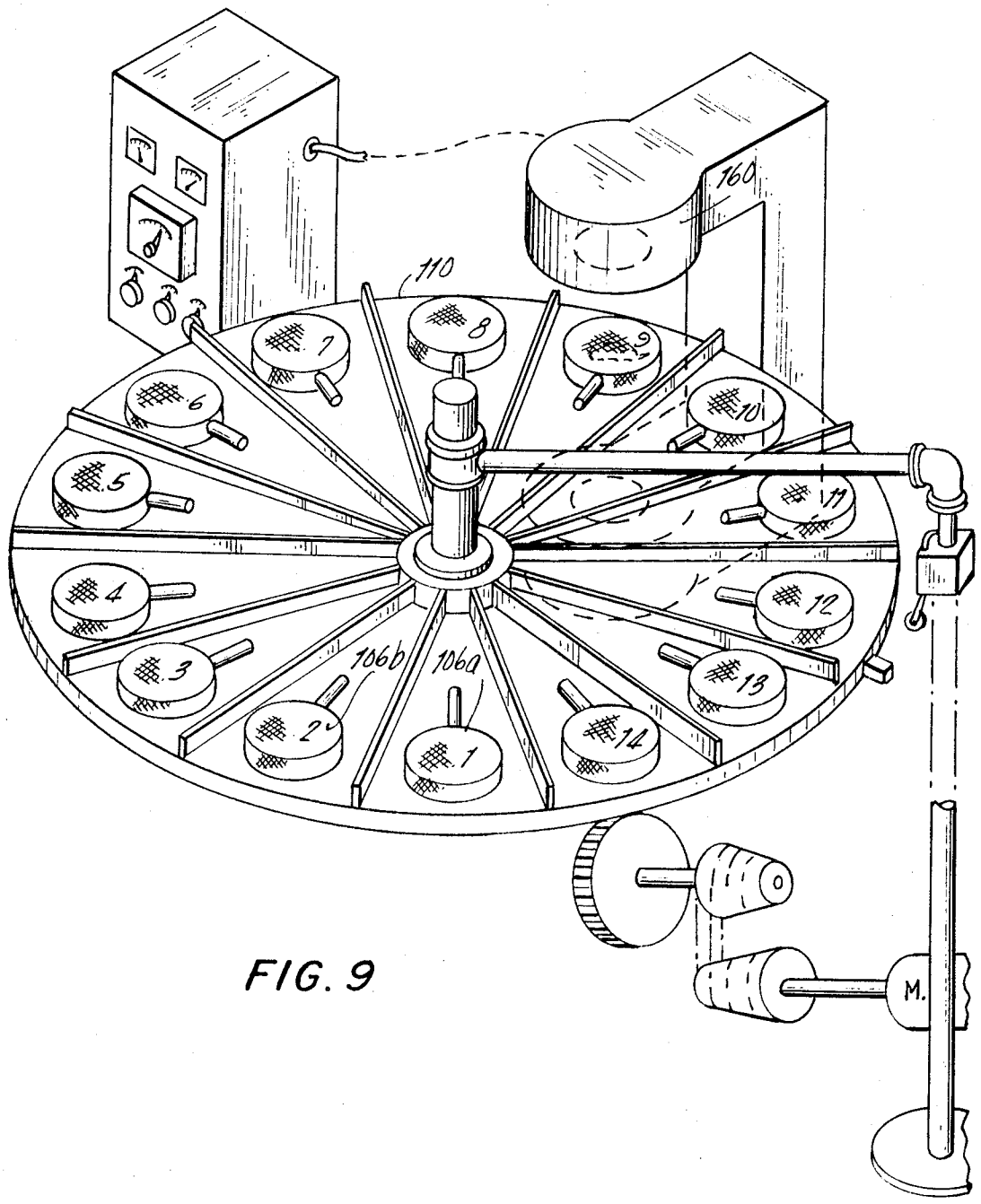


FIG. 9

INVENTOR.
KENNETH S. MACLEAN
BY
ATTORNEY

METHOD OF TREATING LIVING THINGS USING HIGH INTENSITY PULSED MAGNETIC FIELD

This application is a continuation-in-part of application Ser. No. 547,125, filed Mar. 21, 1966, now abandoned, which is a continuation - in - part of application Ser. No. 301,108, filed Aug. 9, 1963, now abandoned, which is a continuation - in - part of application Ser. No. 794,492, filed Feb. 20, 1959, now abandoned.

This invention relates to the treatment of various diseases in living things to relieve pain and other symptoms thereof, and more particularly to a method employing a magnetic field for such treatment.

Magnetic therapy for the treatment of disease has been suggested in the past, but the methods heretofore employed have not been entirely successful. Some of these methods have employed constant magnetic fields provided by permanent magnets, while others have used intermittent magnetic fields of relatively low intensity and/or high frequency.

It is an object of the present invention to provide a method for treating living things, to successfully relieve pain and other symptoms, involving use of a high intensity, low frequency, pulsed magnetic field.

The reason for using a pulsating magnetic field in the method of the present invention rather than a constant field, as in the prior art, is because it empirically produces more beneficial results. It is believed that the explanation of this phenomenon is that the energy can only be transmitted by a fluctuating field, and that only a pulsating field can produce current flow of energy which can be transmitted to objects within the magnetic field. While applicant would not wish to be limited to this theoretical explanation, he believes that it explains the surprising and improved results he has achieved, by using a pulsating rather than constant magnetic field.

It has been found that there is a characteristic pattern of response to a pulsed High Magnetic Field which includes stimulation of the endocrine glands (which regulate and coordinate body function), relief of pain, suppression of cough and pleural effusion, energizing effects, clearing of the sensorium, relaxation of muscle spasm, development of peace of mind and a sense of well being, and increase of libido.

Records and sworn statements of the attending physicians, regarding the individual case histories of almost 100 patients, are on file at the U.S. Patent Office in connection with the above-mentioned earlier applications Ser. Nos. 547,125 and 301,108, in which it was shown by a preponderance of factual medical evidence that the treatments were effective in individual cases, in the sense that pain was relieved, and that the adverse symptoms of the condition being treated were eliminated or diminished.

These affidavits are hereby incorporated by reference into the present application.

Exhibits A1 – A22, which contain letters and affidavits of noted physicians stressing the improvement in patients who had been exposed to the pulsed high-intensity magnetic fields of the subject invention.

Exhibits E1 – E4, which disclose the beneficial results obtained on patients suffering from certain disorders.

Exhibits F1 – F32, which are reports of patients suffering from illnesses who were beneficially treated by the invention.

Thus, it will be seen that Applicant has already submitted, in the form of affidavits, the results of clinical tests on approximately 100 patients. All were treated according to the method of the present invention, and the intensity of the pulsating magnetic field, the duration of the impulse, and other conditions of treatment were generally within the ranges disclosed in the examples set forth in this present application.

It is my theory that increased strength or energy can be acquired directly by exposing the body to strong pulsed high intensity magnetic fields delivering electromagnetic energy, which can be used to improve biologic and physiologic functions.

Since man is a biomagnetic system, it is obvious that the exposure to an increased field will have an effect and the effect would have very definite relation to the amount and method of

administering that energy. In general it can be shown that exposure to high magnetic fields stimulates the nervous and endocrine systems which regulate, coordinate and control the body, elevate low basal metabolic rates, and regulate irregular menstruation. In other cases the response in large part is local and provides a logical explanation for the basic cause of many symptoms as well as indicates the proper therapy of many illnesses.

In the treatment of pain, for example, the result achieved using the method of my invention, is complete relief, regardless of the cause except in obviously neurotic patients. The increased energy stimulates the individual's system. In treating sprains and spasms there has been a discontinuation of the former special strapping and usual physical modalities. In contrast, the cell membrane theory is considered.

All cells at rest, whether plant or animal, contain 70 millivolts at rest. This potential can be measured using a voltmeter and is caused by the negative ions within the cell lining up (polarizing) with the positive ions without the cell. If something occurs which causes the cell to lose its polarization, then the adjacent cells, including the nerves and muscles, lose their polarization, and the result is contraction. If, however, there is great depolarization, the body takes considerable time to restore itself to polarization, and this excess depolarization is called "spasm." The condition applies to the muscles of the extremities, the colon or the heart. The treatment of depolarization is to polarize, which is done with a pulsed high-intensity magnetic field.

For a better understanding of my invention, reference is had to the description and illustrative embodiments as shown in the drawings in which:

FIG. **1** is a view in perspective showing my apparatus in full assembly;

FIG. **2** is a sectional view of my electromagnet in the direction of the arrows **2—2** in FIG. **1**;

FIG. **3** is an exploded view in perspective of the poles of my electromagnet;

FIG **4** is another form of an electromagnet in full assembly shown in perspective;

FIG. **5** is another form of an electromagnet in perspective;

FIG. **6** is a sectional view taken along lines **6—6** of FIG. **4** showing the assembly at a pole of my electromagnet;

FIG. **7** is a sectional view showing another form of an electromagnetic apparatus in elevation;

FIG. **8** is a sectional view of my electromagnetic means taken on the line **8—8** of FIG. **7**; and

FIG. **9** is a perspective view of a carousel apparatus having a turntable and stations thereon with cages and positions movable past a stationary source of pulsed high-intensity electromagnetic energy.

The technique of the invention resides in placing the living thing or tissue to be treated within a pulsed electromagnetic field of relatively high intensity effected by a direct current source.

This treatment can be carried out by a number of variously designed machines, examples of which are hereinbelow described in detail.

Referring principally to FIGS. **1** and **2**, my electromagnetic apparatus is generally designated as number **10**.

An electromagnetic means **12** is movably mounted on cable assembly **14**. Cables **15** *a*, *b*, and *c* are passed over pulleys **16** *a*, *b*, and *c* and are attached to electromagnetic means **12** at **17**, **18** and **19**. Counterblances **13** *a*, *b*, and *c* are attached to **15** *a*, *b*, and *c* at **17'**, **18'** and **19'**. The electromagnetic means **12** may be adjusted to any desired position by manipulating counterbalances **13** *a*, *b*, and *c* in either an upward or downward direction.

The electromagnetic means **12** comprises a pair of magnetic pole pieces or cores **20** and **22** connected to a flexible laminated steel yoke **24** at right angles to the yoke at **26** and **28**. Due to the flexibility of yoke **24**, adjustable means are provided to prevent the pole pieces from being attracted to any appreciable extent. This is necessary because when treating a

patient, the patient is positioned between the poles and therefore the attraction of the poles to any great extent could cause discomfort to the patient. Appropriate means can be provided to restrain the poles from being attracted when an electromagnetic field is induced, such as connecting the poles to a rigid support.

Parallel plates **30** and **32** are mounted on poles **20** and **22** respectively as shown in FIG. **2**. Parallel plates **30** and **32** are preferably in circular form and may be made from metal, wood or rigid plastic.

A single length, or a plurality of lengths coupled together, of superflexible copper cable **34** is disposed between parallel plates **30** and is coiled in a clockwise direction around pole piece **20**, and similarly cable **34** is disposed between parallel plates **32** and coiled around pole piece **22** in a counter-clockwise direction. It is obvious that in winding cable **34**, the directions may be reversed. However, it is preferred that the cable used should be wound clockwise on one pole piece and counter-clockwise on the other. The cable is preferably formed in a continuous length so that the cable may be attached between the pole pieces **20** and **22** as shown in FIGS. **1** and **2**. The ends of cable **34** are operably connected to a direct current power source S which is shown in the drawings in FIG. **1**. The direct current power source is of a conventional type such as a DC rectifier sold by the Meaker Company, Nutley, N.J. Power source S has a maximum output of 500 amperes and 24 volts. The flux density or gauss that can be produced by the electromagnet depends upon several variables, mainly the number of turns of wire used around each pole piece or the output of power source S. When using power source S at maximum output and when 60 turns of size 0 copper wire are used, approximately 6,000 gauss is produced when the pole pieces are 2 in. apart. The gauss or flux density is controlled at power source S by manipulating the appropriate control means.

When using my apparatus, the flux density produced may be controlled and varied in any desired manner. Thus, I can provide a pulsating magnetic field of a desired flux density in which the pulsations may be controlled for desired intervals of time and may be provided at a constant predetermined frequency. The pulsations may be controlled automatically or manually as desired and, further, the flux density produced may be controlled at a constant level without varying or causing the field to pulsate.

Pole pieces **20** and **22** are made of rolled steel having a diameter of approximately 3 inches and are tapered to form a cone, the rounded apex of which is approximately 1 inch in diameter. FIG. **3** shows an exploded view in perspective of the construction of my pole pieces. The sections **20'** *a*, *b*, and *c* and *d* are threadedly connected and may be lengthened or shortened as desired. Further, when a small area is desired in order to concentrate the magnetic field, section **20'** *a* should be used. Where a concentration of the magnetic field is not necessary, the sections **20'** *b*, *c* or *d* may be used. It is obvious that any number of sections may be added to lengthen my pole pieces; however, the pole pieces should be of such a length that they substantially contact the area of the patient being treated.

When a pulsating magnetic field is being maintained over a relatively long period of time, the pole pieces tend to become heated. In such case, a pole piece may be designed in which a cooling means will maintain the pole piece at ambient temperatures, for example by a cooling fluid or circulation of air.

FIG. **4** shows an electromagnet **12'** in the form of a rigid horseshoe. Electromagnet **12'** comprises a plurality of laminated iron sheets **36** and threadedly connected to the ends thereof are a pair of iron cores or pole pieces **37** and **38**. Pole pieces **37** and **38** may be shifted transversely so that the distance between the pole pieces may be varied as desired.

A series of 9 coils of copper wire connected in tandem, not shown, are disposed around the outer surface of electromagnet **12'**. Each coil consists of 8,000 turns of size 24 copper wire, so that each end when operably connected to power source S', will provide a magnetic field of approximately 2,400 gauss. Power source S' shown in FIG. **4** is a DC rectifier having a 5-½ amperes 200 volts maximum output. The flux density that is produced by electromagnet **12'** can be controlled as previously described in FIG. **1**.

FIG. **5** is an elliptically formed electromagnet which is provided with pole pieces **40** and **42** disposed perpendicular at the ends thereof. Pole pieces **40** and **42** are constructed in a similar fashion as described in FIGS. **2** and **3**. Also copper coils, not shown, are provided in a similar manner as described in FIG. **4**.

FIG. **6** is a sectional view of pole piece **37** and shows the pole piece parts threadedly connected to each other arranged in tandem fashion.

In FIGS. **7** and **8**, I show another form **44** of my electromagnetic apparatus, in which the power source is similar to power source S previously described.

Vertical frame **46** is rigidly supported by base frame **48**. Base frame **48** is provided with front and rear wheels **50** and **52** rotatably mounted on front and rear axles **51** and **53**. Thus, apparatus **44** may be used as a portable unit. Mounted to base frame **48** and horizontally spaced from frame **46** is a second vertical frame **54**. Brackets **56** are rigidly mounted and spaced between frames **46** and **54** to provide further support to said frames.

Vertical frames **46** and **54** are constructed from steel or other suitable material which can be used to support the electromagnetic assembly **60**. The peripheral sides of frames **46** and **54** are made in the form of channels **47** and **55** so that electromagnetic assembly **60** and its counterbalance assembly may be movably mounted therein.

Electromagnetic assembly **60** comprises a lift **62** movably mounted in frame **46**. Guide wheels **64** are rotatably mounted on lift **62** and engage the channel portion of frame **46** so that lift **62** is shiftable in an upward and downward direction. A pair of detachable cables **66** are connected to lift **62** at **67** and are passed over pulleys **68** and **69**. Detachable cables **66** are connected movably mounted in channels of frame **54** so that it may be guided therein when the electromagnetic assembly **60** is shifted in an upward or downward direction.

A circular plate **72** is mounted on lift **62** and is formed with a track **74** around the circumference thereof so that the electromagnetic assembly **60** may be rotated to any desired position. Assembly **60** is mounted to a pair of cross-members **77** and at the ends thereof are mounted wheels which communicate with the interior of track **74** as shown in FIGS. **7** and **8**.

Electromagnet **75** is detachably mounted to cross-members **77**. Also, restraining brackets **78** are slidably mounted on brackets **77** at **80** and are attached to electromagnet **75** at **82**. A deflecting means **84** is provided at the free end of brackets **78**. Thus, by shifting the deflecting means **84** inwardly, the poles of electromagnet **75** are moved closer together. Electromagnet **75** is constructed similarly as described in FIGS. **1** and **2**.

As shown, electromagnetic apparatus **44** is a portable unit in which the electromagnetic means **60** is movably mounted so that it can be shifted in an upward and downward direction and also the electromagnetic apparatus can be rotated to any desired position with relative ease.

When employing my electromagnetic apparatus **10** for treating a patient, the following is a representative method of treatment. The site to be treated is subjected to a relatively high pulsating magnetic field. I preferably employ a pulsating magnetic field of at least 2,000 gauss with each impulse lasting at least ¼ second and at a frequency of less than one impulse every ½ second.

The following is an example of a method for treating a patient employing a pulsating magnetic field.

EXAMPLE A

A patient to be treated is placed in an appropriate position either standing, sitting or reclining, depending upon the physi-

cal condition of the patient and the duration of the treatment. The poles of the electromagnet are positioned so that one pole is in front and the other is behind the site to be treated. The patient is thereafter subjected to a pulsating magnetic field of 100 ½ second impulses of 3,600 gauss administered over a period of from 2 to 3 minutes and repeated every 20 to 30 minutes for a period of 3 hours. Half of the impulses are administered to the known areas of disease. The remaining impulses are administered to the sites of the chest, abdomen and endocrine glands, with special attention to the thymus gland and large muscles. The above treatment is repeated at least 10 times within a 2 week period and then reduced to 2 or 3 times weekly.

Thereafter, only occasional treatment is continued as necessary to maintain the patient's improved condition. The patient's response to the treatment is characterized by relief of pain, development of a sense of well-being, suppression of cough and pleural effusion, improved appetite and energy, stimulated libido and a clearing of the sensorium.

I have found when treating patients for diseases, according to my invention, the patient's response to the treatment shows improvement in all cases regardless of diagnosis. A representative group of diseases that have been treated and in which improvement of the disease was observed are rheumatoid and osteoarthritis, duodenal and peptic ulcers, menopausel syndrome, ulcerative colitis, migraine headaches, depression and anxiety states, especially those due to frustration, bursitis, sprains, fibrositis, burns, allergies, pain associated with toothaches, pain syndrome, acute colds, control of appetite, sinusitis, arthalgia, emphysema, stimulation of endocrine and nervous systems, muscle spasm, insomnia and improvement of complexion. Since the nervous and glandular systems are stimulated by electromagnetism, the physical condition of the patient being treated generally is characterized by an improvement in eyesight, and hearing, and restoration of hair color to substantially its youthful appearance in addition to the patient's responses described above.

The following is an example of a method for treating a patient for diseases such as osteoarthritis employing a pulsating magnetic field.

EXAMPLE B

The patient to be treated is placed in an appropriate position, either standing, sitting or reclining, depending upon the physical condition of the patient and the duration of the treatment. The electromagnet is positioned as described in example A and the patient is subjected to a pulsating magnetic field. The sites of treatment are the endocrine glands and affected joints. 100 ½ second impulses of 3,600 gauss are administered for periods of from 1 to 2 minutes and are continued at least daily until the patient's response shows a definite improvement. The treatments are then reduced to 2 or 3 weekly and thereafter are continued only as necessary to maintain the patient's improved condition.

In the arthritic patient, the general physical condition is observed to be improved and the pain associated with the disease is substantially reduced to a point in which the patient has free use of the afflicted sites.

The caring for patients with disease for which there are no specific therapies is generally a prolonged process which requires the services of skilled personnel including physicians. With the use of automatically controlled electromagnetic apparatus to administer relatively high magnetic fields to patients, it is possible for a single attendant to administer the treatment effectively. A minimum of physical effort is required for treating large numbers of patients with no discomfort or pain associated with the treatment. Thus, when using my apparatus for the treatment of patients, personal supervision is not required and time and labor saving is effected thereby.

The magnetic intensity provided by my apparatus may vary greatly. However, I have found that beneficial results are obtained when a pulsating magnetic field of at least 2,000 gauss is provided. Further, an impulse of at least ¼ of a second duration administered at a frequency of at least 1 impulse every ½ second has been found beneficial. Generally, the preferred treatment in which a pulsating magnetic field is used is to provide a maximum number of impulses within a minimum period of time although the frequency at which the impulses are administered may be given over a protracted period of time. Many modifications may be employed in my apparatus and the method of providing the pulsating magnetic field may vary greatly. Further, other diseases and illnesses in which a pulsating magnetic field may be employed may also be treated.

FIG. **9** illustrates a modified form of the apparatus suitable for automatic treatment and testing of the effects of the high intensity electromagnetic pulses in accordance with the above-described methods and principles.

In operation, the circular rotatable table **110** is provided with a plurality of stations thereon, here 14 actually being provided. The stations sequentially pass the body, animal or material to be tested periodically between the poles of the electromagnet **160**. The specimen or material or animal at the moving test stations **106***a*, **106***b*, **106***c*, etc. on the turntable **110** is thus automatically exposed to a predetermined pulsed magnetic field for a pre-set period of time, in accordance with the examples given herein. This simple structure assures that the testing can be done with more precision than by any other apparatus formerly available.

While I have described embodiments of my invention in the specification and shown my apparatus by the illustrative drawings, changes may be made thereto without departing from the scope of the appended claims.

What is claimed is:

1. The method of treating a living thing or part thereof, which comprises positioning so as to expose at least a part of said living thing in proximity to the pole face of an electromagnet, said electromagnet having at least one pole face, causing an intermittent direct current to flow through said electromagnet so as to produce an intermittent magnetic field at said pole face having a field density of at least approximately 2,000 gauss at the peak of each pulse, and simultaneously regulating the frequency of the intermittent direct current to produce magnetic impulses at a frequency of less than 1 impulse every ½-second, each said impulse having a duration of at least ¼ second.

2. The method as set forth in claim **1**, said field being induced between the pole faces of an electromagnet, and including the step of controlling said intermittent direct current flow to provide said magnetic field having a field density of at least approximately 2,000 gauss at the pole faces when the pole faces are 4 in. apart.

3. The method as set forth in claim **1**, including the step of controlling the direct current so that the magnetic field density in gauss declines to a zero value between the peak gauss points of successive pulses, causing the intermittent direct current to flow through said electromagnet in such manner so as to produce an intermittent magnetic field of approximately 5,000 to 7,000 gauss magnetic field density, and applying from 100 to 1,000 impulses having a peak duration of about ½ second at a frequency of one every 4 to 10 seconds.

4. The method as set forth in claim **1**, including the steps of positioning a selected site of said part between two pole faces of an electromagnet, causing the intermittent direct current to flow through said electromagnet in such manner so as to produce an intermittent magnetic field of about 3,600 gauss flux intensity, applying about 100 ½-second duration impulses to said selected site over a period in the range of from 1 to 3 minutes, and repeating the foregoing 100 ½-second impulses on said selected site up to approximately 9 times in 3 hours.

* * * * *