J. E. SEELEY.

PORTABLE ELECTROTHERAPEUTIC APPARATUS.

APPLICATION FILED AUG. 20, 1914.

1,173,540.

Patented Feb. 29, 1916.

Fig. 1.

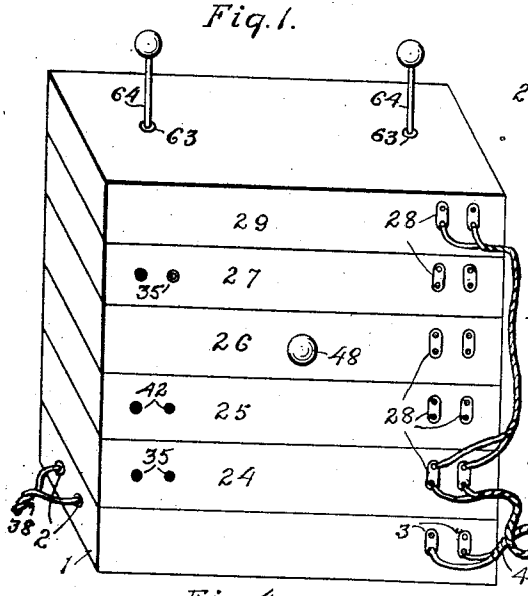


Fig. 2.

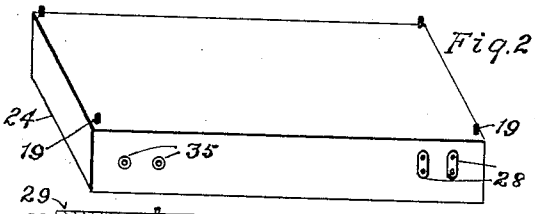


Fig. 3.

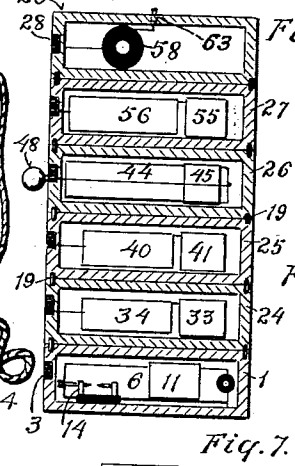


Fig. 10.

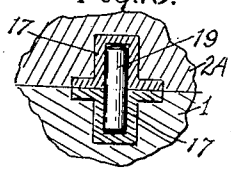


Fig. 11.

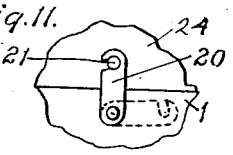


Fig. 4.

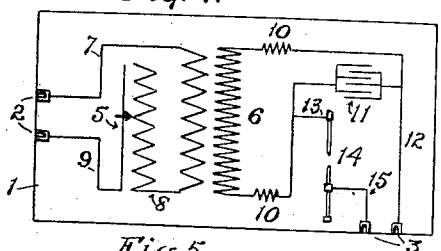


Fig. 5.

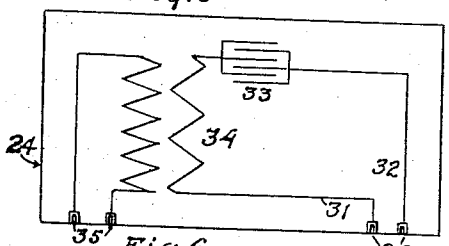


Fig. 6.

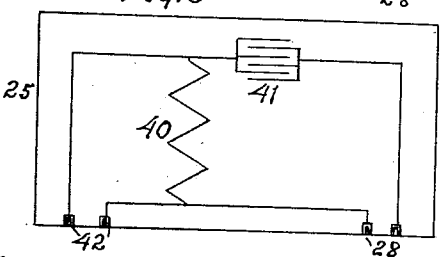


Fig. 7.

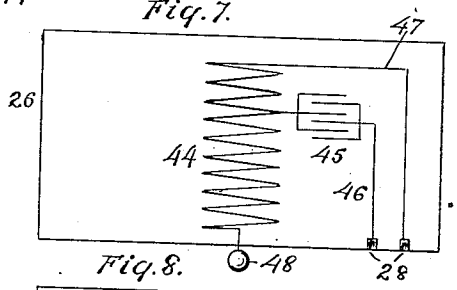


Fig. 8.

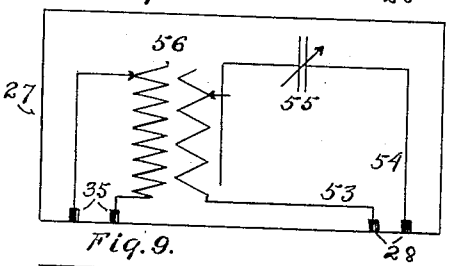
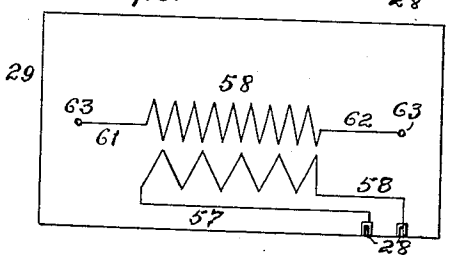


Fig. 9.



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L. G. Mallett.

Inventor:
James E. Seeley
by Arthur P. Knight
his Atty

UNITED STATES PATENT OFFICE.

JAMES E. SEELEY, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO VULCAN COIL COMPANY, OF LOS ANGELES, CALIFORNIA, A CORPORATION OF CALIFORNIA.

PORTABLE ELECTROTHERAPEUTIC APPARATUS.

1,173,540. Specification of Letters Patent. Patented Feb. 29, 1916.

Application filed August 20, 1914. Serial No. 857,654.

To all whom it may concern:

Be it known that I, JAMES E. SEELEY, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Portable Electrotherapeutic Apparatus, of which the following is a specification.

This invention relates to electrotherapeutic apparatus, and the main object of the invention is to provide a convenient portable apparatus which is capable of producing different kinds or modalities of current or electrical action, suitable for different purposes, and which is so divisibly constructed that in any given case the amount of apparatus required to be carried is limited to that which is necessary to produce the one or more modalities which it is desired to use.

Another object of the invention is to provide, in an electrotherapeutic apparatus, a means for supplying energizing current of a character adapted for energization of any one or more of a plurality of electrotherapeutic devices, and in separable connection with such energizing means, a plurality of modifying devices adapted to receive current from such energizing device and to modify the same in different manners, to produce different electrotherapeutic effects. There are many different electrotherapeutic operations which require energizing current of the same general character, namely, a high tension, high frequency, oscillatory current, and by providing an energizing element capable of furnishing such a current and a number of modifying elements adapted to be operated interchangeably or concurrently by connection with such energizing element, I am enabled to produce, at minimum cost, a device adapted to the different needs of different practitioners. In general, the cost of the energizing means for producing the oscillatory current is a large portion of the total cost of an electrotherapeutic apparatus of this nature, and to provide an entirely separate energizing apparatus for each modality of current to be furnished would be unduly expensive. On the other hand, an apparatus in which all the modalities are provided for in a permanent indivisible machine would also be unduly expensive for those practitioners who only desire to use, say, one or two kinds of current-action. Moreover, in a portable machine, it is desirable for the practitioner to be able to select from a set of different modifying devices, one or more which may be required in a particular case, so as not to have to carry more than is necessary. My invention therefore enables a practitioner by purchasing an energizing element and one or more of the modifying elements, to obtain, at reasonable cost, a machine having a range of operation adapted to his special needs, and to enlarge his outfit from time to time, as his work demands it; and it also enables him to carry with him, at any time, just what is necessary for the work in hand and no more.

The accompanying drawings illustrate an embodiment of my invention, and referring thereto:

Figure 1 is a perspective view of the apparatus in assembled condition. Fig. 2 is a perspective view of one of the current modifying sections. Fig. 3 is a vertical section of the apparatus. Fig. 4 is a diagram of the circuit connections for the energizing element or section of the apparatus. Figs. 5 to 9 are diagrams of the circuit connections for different modifying elements or sections of the apparatus. Fig. 10 is a vertical section of a form of coupling or connecting means for adjacent sections. Fig. 11 is a side elevation of another form of connecting means.

The apparatus comprises a plurality of sections or elements, stacked or piled one on another, and detachably connected, each of these sections being formed as a case or box, containing suitable electric devices. One of these sections or elements, indicated at 1, is provided with means for producing an oscillatory current, adapted to energize the apparatus of the other sections or elements, with terminals or connecting means 2 whereby it is connected to a suitable supply circuit, and with terminals or means 3, whereby it may be connected through suitable connecting cords 4, to one or more of the other sections or elements.

In Fig. 4, is shown one form of apparatus suitable for use in section 1, such apparatus comprising a current controller consisting of an adjustable impedance, resistance or reactance 5, and a step-up transformer 6, connected by wires 7, 8 and 9 in a circuit connection leading from one of the termi-

nals 2, through the said controller and the primary winding of said transformer to the other terminal 2. The secondary winding of said transformer is connected, at opposite ends, through small inductive resistances or choke coils 10, to opposite sides of a condenser 11, one side of the condenser being connected by wire 12, to one of the delivery or outlet terminals 3, and the other side of the condenser being connected by wire 13 to one side of a spark gap device 14, whose other side is connected by wire 15 to the other outlet terminal 3. The above described devices are mounted within the inclosing case 1, of wood or other suitable material, said case being closed at the bottom and at all sides, and also preferably closed at the top, and being provided with external sockets 2 and 3 serving as the inlet and outlet terminals. In order to join this case to the case of the next section above the same, the case 1 is provided with any suitable coupling means, for example sockets 17, (see Fig. 10) adapted to receive dowel pins 19, for engaging similar sockets in such adjacent section. Or, if desired, shutter bars or hooks 20 may be provided, as shown in Fig. 11, pivoted on the case 1 and adapted to swing into engagement with pins or buttons 21 on the adjacent section.

The modifying sections or elements cooperating with the aforesaid energizing element may be of any desired number, according to the number of different effects or modalities it is desired to obtain. In Figs. 1 and 3 of the drawings I have shown five of these sections, 24, 25, 26, 27 and 29, each provided with means such as above described for mechanical connection with the next underlying section, and each provided with inlet terminals 28, for connection with the cord or conductor leading from the energizing section or from one of the other sections.

Section 24, (Fig. 5) is shown as adapted for the production of diathermic currents, to effect internal heating of the organs or parts to which they are applied. This section comprises primary circuit wires 31, 32, connected to the inlet terminals 28 and including a condenser 33 and the primary winding of a transformer 34, which is preferably an air core transformer, and a secondary circuit including the secondary winding of said transformer, and connected to outlet terminals 35, adapted to receive the cord or cable for leading the current to the electrodes for application to the part under treatment. With this apparatus, the quantity of current that can pass in the primary circuit is limited by the capacity of the condenser 33, and by suitably proportioning the windings of the transformer, the applied current may be made of any desired voltage, according to the resistance of the part to be treated, it being understood that the circuit is so adjusted or tuned, that the frequency is sufficiently high to avoid any danger to the patient.

In the operation of this device, the inlet terminals 28 are connected to the outlet terminals 3 of the energizing section 1, by means of the cord or cable 4, see Fig. 1, and said energizing section is connected to an alternating current supply circuit, by cable or cord 38, connecting with terminals 2 thereof, and the outlet terminals 35 are connected by a suitable cord or cable to the electrodes for applying the current to the part to be treated. Alternating current supplied to the primary coil of the energizing section 1, operates to periodically charge the condenser 11 by high tension current induced in the secondary winding of transformer 6, and when the tension during any period becomes sufficient to break down the resistance of the air gap at 14, an oscillatory discharge passes from the condenser through the circuit including the wires 12 and 15, terminals 3, cord 4, terminals 28 and the primary circuit wires of the section 2, including the condenser 33, and the primary winding of the transformer 34. The choke coils 10 prevent the high tension, high frequency discharge from the condenser from passing back to the transformer or induction coil 6. There is thus produced in the secondary circuit of said transformer, a current of high frequency and high tension, which, being applied by suitable electrodes to the part to be treated, gives a diathermic internal heat generating effect to such part.

Section 25, shown in Fig. 6, comprises simply an inductance or self induction coil 40, and a capacity or condenser 41, connected in series between the terminals 28 for this section, so that when an oscillatory current is supplied thereto from section 1, by connection of cable 4 to the said terminals 28 and 3, an extremely high rate of oscillation is produced in the coil 40 in this circuit, and true D'Arsonval currents may be taken from the outlet terminals 42, connected to opposite ends of said coil. Such a current is extensively used in the treatment of arteriosclerosis, or high blood pressure, and cannot be generated, in its true form, from an inductance in inductive relation with other inductance.

Section 26 is for the purpose of producing what is known as the "Oudin effluve" or stationary wave, and comprises, as shown in Fig. 7, an Oudin resonator 44, whose primary coil is connected in series with a condenser 45, by wires 46 and 47, leading from the inlet terminals 28 for that section. The electrode 48 for the resonator may be mounted on the front of the case for this section. Such an apparatus is extensively used in the treatment of nervous diseases

and skin troubles. As it develops extremely high tension and high frequency, it requires very high insulation, and for that reason it has not, to my knowledge, heretofore been used in a portable apparatus.

The device in section 27, shown in Fig. 8, may be used to give a low periodicity effect, said device comprising a primary circuit 53, 54, including a variable capacity or adjustable condenser 55, and a variable inductance or adjustable induction coil 56, whereby the inductance and capacity of this circuit may be varied to give any desired periodicity in said primary circuit, for example a periodicity sufficiently low to simulate the "Morton wave" effect. The secondary circuit of the induction coil 56 may also be made of variable impedance, for example, by adjustment of the secondary winding of said coil.

Section 29, Fig. 9, is for generating ordinary high tension, high frequency current such as is suitable for X-ray work, and comprises a step-up transformer 50 whose primary winding is connected by wires 57 and 58 to the inlet terminals 28, for this section, and whose secondary winding is connected by wires 61 and 62 to the outlet terminals 63, which may be formed as sockets in the top of the containing case for that section, adapted to receive posts 64, to which are connected the wires leading to the X-ray tube.

Any other modifying devices may be used, in addition to, or in place of those above described. The connecting cable 4, leading from the energizing section is shifted to one or another of the sets of terminals for the various modifying devices, according to which one is to be used, and, in some cases, more than one of the modifying devices may be required to be used simultaneously, and in such cases, either a cable having double connectors is used or as shown in the drawing, the connection is continued from one of the sets of inlet terminals to another set by means of a cable 59, the sets of terminals being double to permit of such connection. As an example of such combined use of two of the modifying elements, the sections 24 and 29 may be used simultaneously for the simultaneous production of X-ray and diathermic effects, which is claimed by some operators to be advantageous. Another example of such concurrent operation of two of the modifying sections is the use of section 29 for the energizing of a "Coolidge tube" and of section 24 for producing the current for heating the anode of such tube. The secondary of the air-core transformer in section 2 may readily be constructed with such high insulation that it may be safely put in direct connection with the said anode.

The apparatus constructed as above described is sufficiently light and compact to enable it to be easily carried, either as a whole or with any one or more of the sections omitted, and to facilitate such carrying, a suitable carrying case may be provided, adapted to hold the apparatus, or any desired part thereof, in assembled relation.

What I claim is:

1. A portable electrotherapeutic apparatus comprising a plurality of sections, each formed with an inclosing case and with means for detachable attachment thereof to adjacent sections, one of said sections being provided with means for receiving current and for producing oscillatory current therefrom, and the other sections being provided with means for receiving such oscillatory current, with means for modifying the same, and with outlet means for delivering the modified current.

2. A portable electrotherapeutic apparatus, comprising an energizing element provided with means for receiving current and for producing oscillatory current therefrom, and with outlet terminals, and a plurality of modifying elements, detachably attached to one another and to said energizing element, and provided with means for variantly modifying the oscillatory current supplied thereto, and detachable electric connecting means adapted to connect the outlet terminals of said energizing element interchangeably with the different modifying elements.

In testimony whereof I have hereunto set my hand, at Los Angeles, California, this 13th day of August, 1914.

JAMES E. SEELEY.

Witnesses:

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OSCAR E. WINBURN.