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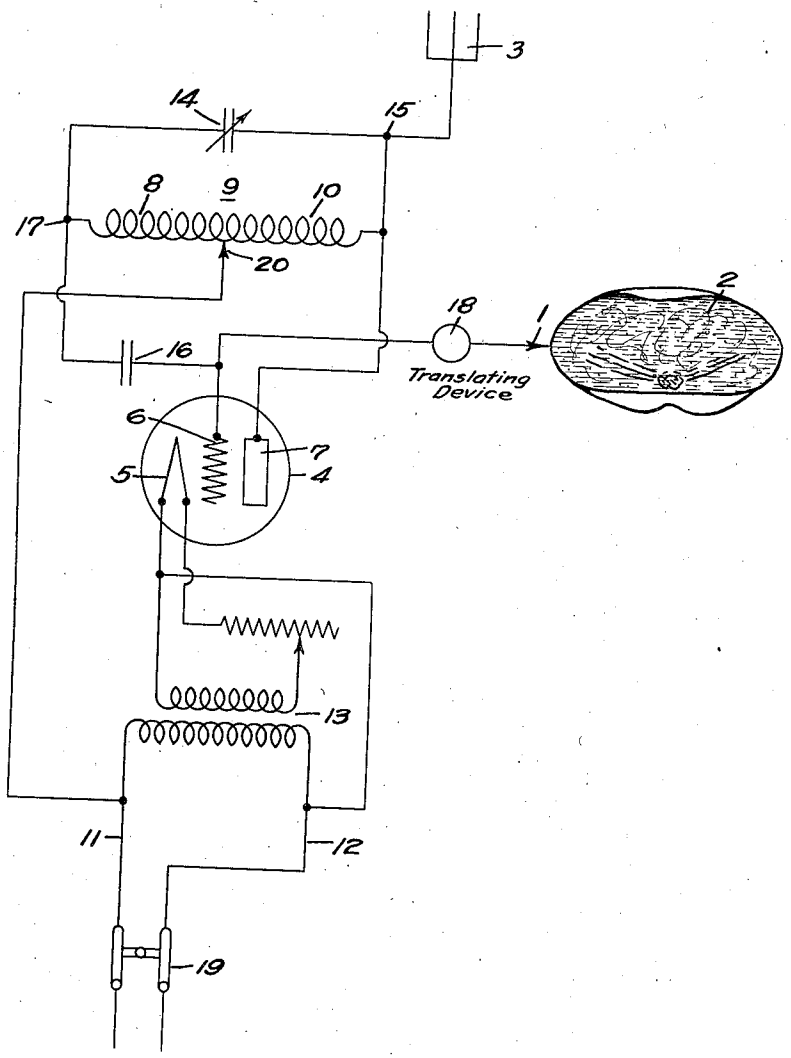
APPARATUS FOR TREATING DISEASE

Filed June 18, 1923

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# UNITED STATES PATENT OFFICE.

HERBERT P. TRAMBLEY, OF SAN FRANCISCO, CALIFORNIA.

## APPARATUS FOR TREATING DISEASE.

Application filed June 18, 1923. Serial No. 645,997.

*To all whom it may concern:*

Be it known that I, HERBERT P. TRAMBLEY, a citizen of the United States, and a resident of the city and county of San Francisco, in the State of California, have invented a new and useful Apparatus for Treating Disease, of which the following is a specification.

This invention relates to a scheme for the treatment of disease by the aid of periodic currents.

While the use of electric currents of relatively high frequency for producing physiological effects upon living organisms has been well known for a relatively long period, the utility of regulating the point of application as well as the frequency of the current in accordance with the curative or anæsthesia effects desired was not recognized until comparatively recently. In accordance with this method as now practiced extensively, a spark set is used to generate damped high frequency waves, and the frequency is adjusted in any well-known manner to produce physiological effects upon the patient. In order to effect cures or at least arrest the disease, such treatments are administered at frequent intervals. It is not essential, so far as my present invention is concerned, to elucidate the further theory of this mode of treatment, since these principles are well described in current publications—for example in a series of articles dealing with the electronic reactions of Abrams, in Pearson's Magazine for June, July and August of 1922. It is however an object of my invention to provide a more powerful device for propagating the electric oscillations, whereby their effects may be intensified, and fewer treatments, or of less duration, need be given to secure the desired results.

In order to further this object, I prefer to use as the oscillation generator, a vacuum tube device. This has the advantage that it is capable of producing substantially undamped oscillations which are more effective than the highly damped wave forms of a spark transmitter. In this connection it is another object of my invention to provide a new form of oscillator.

In order to detect the existence of the radio frequency current where applied, so that the operator of the device may be advised of its proper functioning, it is desirable to produce some form of modulation of the current. It is thus another object of my invention to produce a modulated radio frequency current in a novel manner. So far as this feature of my invention is concerned, it may be utilized in connection with other forms of translating devices, such as radio transmitters, or the like.

It is another object of my invention to render radio frequency current available for treatment merely by the aid of a commercial source of current, such as a lighting system.

My invention possesses other advantageous features, some of which, with the foregoing, will be set forth at length in the following description, where I shall outline in full that form of the apparatus of my invention which I have selected for illustration in the drawings accompanying and forming part of the present specification. Although I have shown in the drawings but one embodiment of the apparatus of my invention, I do not desire to be limited thereto, since the invention as expressed in the claims may be embodied in, and practiced by, other forms also.

Referring to the drawings:

The single figure is a wiring diagram of one embodiment of the apparatus of my invention.

In this figure, an electrode 1 is used for applying the radio frequency current to any part of the body 2. Since radio frequency is utilized, it is possible to maintain the return electrode 3 out of contact with the body while still transmitting electrical energy thereto. In other words, the electrical energy is transferred partly by radiation. Of course if the voltage of the source were low enough, the electrode 3 might be directly applied to the body 2 to increase the efficiency of the oscillation system.

Although many forms of constant wave generators can be used, I prefer to employ an oscillating thermionic device 4, having a filament 5, a grid or control electrode 6, and a plate or anode 7. The oscillations are produced by permitting an energy transfer from the plate circuit to the grid circuit, in a well understood manner. In the present instance the grid-filament circuit includes a portion 8 of an inductance coil 9, while the filament-plate circuit includes the other portion 10. Thus these two cir-

cuits are inductively coupled together, and a part of the energy in the output circuit comprising the filament 5 and plate 7 is returned to the input circuit comprising the filament 5 and grid 6.

The source of potential for plate 7 may be inserted in any desired location and may be either an alternating or a direct current source. In the present instance leads 11 and 12 are indicated as leading to a commercial lighting circuit. In this way no special apparatus is needed to produce the oscillations, and my invention thus has a marked advantage over the spark system used heretofore; furthermore, the device is substantially noiseless and consequently the treatment is apt to have a better effect on the patient, there being no noisy disturbance. All of these features contribute in making my device a great deal more desirable than others that have already been proposed and used. The alternating current source used for the plate potential simply serves to produce beats in the output current, but these are not objectionable for this purpose. The filament 5 may also be heated from the same source, as by the aid of a step-down transformer 13. In order to provide an oscillatory circuit, a variable condenser 14 is bridged across the inductor 9. By tuning the closed circuit comprising the condenser 14 and this inductor, the frequency produced may be varied within wide limits.

I have shown the load circuit as connecting to one terminal 15 of the oscillatory circuit, and to the grid 6. A condenser 16 of comparatively low capacity is included in the grid-filament circuit, between the grid 6 and that point 17 of the inductor 9 which is nearest the grid. I find that by using this condenser and by connecting one of the electrodes such as 1 on the grid side thereof, I am able to obtain rectified modulated waves, irrespective of the particular forms of current sources used for the filament heating circuit as well as for the plate circuit. This is of considerable importance, since by it the operator can gauge the strength of the current, by using any well known form of translating device 18 responsive to audio frequency and connected to the load circuit.

The operation of the system may now be briefly recapitulated. The tube 4 is set into operation by closing switch 19 and the oscillating circuit 9—14 is tuned to that frequency, either audio or radio, which it is desired to use on the patient's body 2. The amplitude may be adjusted in any well-known manner, as by varying the position of contact 20 on the inductance coil 9. The tube is preferably operated so as to produce a modulated wave. The electrode 1 may now be applied to the desired part of the body. By proper choice of frequency and point of application physiological effects, either curative or anæsthetic, may be obtained, as described in the publications hereinbefore referred to. The tube is a vary reliable source of oscillations; there are no moving parts and little likelihood of improper functioning. Due to the novel form of connection, the translating device 18, which may be phones, for example, responds to the waves even if they are beyond the audibility range. The reasons for this behavior I believe is that the modulated waves become rectified before they pass into the load circuit, but I do not desire to be at all limited to this explanation, which is merely my best understanding at the present time. It is possible that the effect of the fixed condenser 16 upon the grid potential is such that this rectifier action takes place in the tube. However, I do not wish to confine myself to any particular theory of operation, the observed fact being nevertheless as set forth. In case audio frequency treatment is administered, then this form of connection is not of course essential.

I claim:

1. In a system for producing electric oscillations, a thermionic tube having an input and an output circuit, said input circuit including a filament and a control electrode, and said output circuit including the filament and an anode, an inductor connected between the control electrode and the anode for coupling these circuits together, a condenser inserted between the control electrode and the inductor, and a load circuit connected directly across the control electrode and the anode.

2. In a system for producing electric oscillations, a thermionic tube having coupled input and output circuits for direct interchange of energy, said input circuit including a filament and a control electrode, and said output circuit including the filament and an anode, a condenser of small capacity inserted next to the control electrode in the input circuit, and a load circuit connected directly across the control electrode and the anode.

In testimony whereof, I have hereunto set my hand.

HERBERT P. TRAMBLEY.