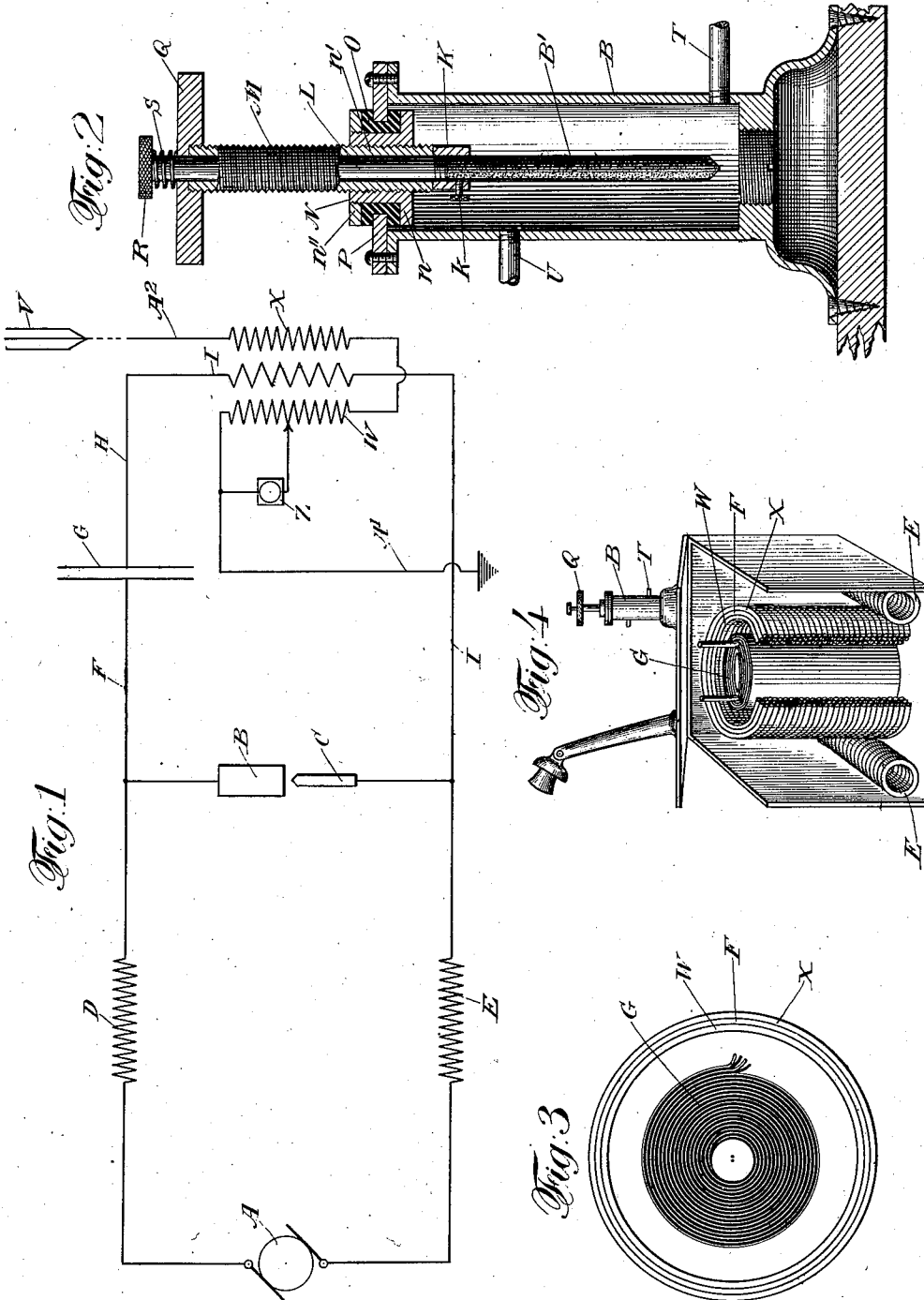


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HIGH FREQUENCY APPARATUS.
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1,023,135.

Patented Apr. 16, 1912.



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UNITED STATES PATENT OFFICE.

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HIGH-FREQUENCY APPARATUS.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WILLIAM DUBILIER, of Seattle, in the county of King, and in the State of Washington, have invented a certain new and useful Improvement in High-Frequency Apparatus, and do hereby declare that the following is a full, clear, and exact description thereof.

The object of my invention has been to provide an apparatus for producing high-frequency oscillations and particularly such an apparatus which shall be capable of use in a wireless telephone, and which shall have, among others, the following advantages: That it shall be exceedingly compact; that it shall be simple; that it shall be inexpensive, and that it shall be highly efficient.

To such ends my invention consists in the high frequency apparatus hereinafter specified.

My invention is capable of embodiment in many different forms, but I have chosen to illustrate it in the form shown in the accompanying drawings, which is the best embodiment known to me. Such embodiment, however, is to be regarded only as typical of many possible embodiments.

In the accompanying drawings, Figure 1 is a diagrammatic view of the embodiment of my apparatus which I have chosen for illustration; Fig. 2 is a vertical sectional view of the lamp used with such apparatus; Fig. 3 is a plan view of the transformer and condenser of Fig. 1, and Fig. 4 is a perspective view of the complete apparatus showing the cover of the case raised to expose the interior thereof.

As shown in the diagram in Fig. 1, constant current is generated by a source of current A, and is delivered to the electrodes B and C of an arc lamp. The usual self-induction coils D and E are provided to prevent the passage of alternating current over the direct current circuit, so as to short-circuit the lamp. An oscillating circuit is provided, comprising a wire F connected with a terminal of the lamp and with a capacity G, a wire H connecting said capacity with the primary I of a transformer, later to be described, and a wire I' connecting the opposite end of said primary with the opposite electrode of the lamp. Thus far described, the invention does not differ from the prior art. The lamp which is shown in section in Fig. 2, comprises a hol-

low electrode B of any suitable conductive material, and an electrode B' within said hollow electrode. The electrode B is clamped in a sleeve K, as by a screw *k*. The sleeve is secured on a rod L, that is mounted in a threaded sleeve M, the latter being threaded into a bushing N. The bushing consists of a disk *n*, a sleeve *n'* and a disk *n''*, screwed on the sleeve, the said disks clamping between them insulating material O, which is placed on opposite sides of and against a disk P screwed to the open end of the hollow electrode. A hand-wheel Q is secured to the sleeve M, so that the latter may be adjusted up and down in the bushing. A collar R is secured to the upper end of the rod L, and a spring S is interposed between said collar and the hand-wheel, so that it tends to draw the sleeve K against the lower end of the sleeve M. By this arrangement, the electrode B can be adjusted the proper distance from the closed end of the electrode C, by turning the hand-wheel, and the arc can then be started by simply depressing the rod L. Upon releasing the said rod, the spring will raise the electrode B, so that the proper degree of separation will automatically occur between the electrodes. The hollow electrode is provided with a pipe T, through which gas may be introduced or a mixture of gas and air, and with an escape U for the products of combustion, thus enabling an atmosphere of hydro-carbon or other gas to be provided, in which a high-frequency arc may be formed.

The primary F of the transformer serves to transmit the oscillations to an aerial V. In the said aerial are two secondaries W and X respectively, which, in coöperation with the said primary are adapted to transmit the oscillations from the said oscillating circuit BFGHIC into the aerial. As shown in Fig. 4, the secondaries W and X are wound on opposite sides of the primary, and I am thus enabled to use substantially all of the flux produced by the primary, both inside and outside of the solenoid, and to transmit an unusually large percentage of the energy generated in the oscillating circuit.

In order to secure compactness, I preferably use a condenser G, consisting of metal interposed between strips of insulating material and rolled into cylindrical form, the cylinder thus formed being of small enough

diameter so that it can go within the coils of the transformer.

In order to adapt the described apparatus for the transmission of speech, a telephone transmitter may be associated with it in any manner which will cause the electro-magnetic waves which are emitted to be influenced to correspond with the sound waves. I have found that I can accomplish this in an exceedingly simple and efficient manner and without the use of any separate source of energy as in a relay circuit by short-circuiting a part of the circuit of the apparatus; as, one or more turns of one of the transformer coils through a transmitter. For instance, as shown in Fig. 1, I have connected a transmitter Z with the ground end A' of the aerial A² and with the coil W of the secondary at a point intermediate its ends. I preferably make the connection between the receiver and the secondary adjustable so as to be able to get the best effect.

While I have described my invention above in detail, I wish it to be understood that many changes may be made therein without departing from the spirit of my invention.

I claim:—

1. In a wireless telephone apparatus, the combination with a primary coil connected with apparatus for inter-transposing sound and electro-magnetic waves, an aerial, and secondary coils in series and upon opposite sides of said primary coil.

2. In a high frequency apparatus, the combination of a primary coil, an aerial, and a plurality of secondary coils in series and upon opposite sides of said primary coil.

3. In a wireless telephone apparatus, the combination of means for producing electric oscillations, means for varying said oscillations to correspond with the voice, a primary coil connected with said apparatus, an aerial, and a plurality of secondary coils in series and upon opposite sides of said primary coil.

4. In a high frequency apparatus, the combination of an arc lamp, means for supplying said lamp with current, an oscillating circuit connected with the electrodes of said lamp, comprising an inductance and a capacity, means for varying said oscillations, an aerial, and secondary coils in series and mounted upon opposite sides of said hollow coil; that is, inside and outside of said hollow coil.

5. In a high frequency apparatus, the combination of means for producing electric oscillations, a primary coil in the form of a solenoid in circuit with said means, means for varying said oscillations, an aerial, and two secondary coils in series and in circuit with said aerial, said secondary coils being in the form of solenoids, one being placed within said primary coil and the other outside of said primary coil.

6. In a high frequency tuning apparatus, the combination of a cylindrical primary, a plurality of cylindrical secondary coils electrically-connected in series with each other, one of said coils being inside of said primary, and the other of said coils outside of said primary, and a condenser placed within said coils.

7. In a high frequency apparatus, the combination of an oscillating circuit having a primary, two secondary coils, one within said primary and the other outside thereof, said secondaries being in series, and aerial connected to one of said secondaries, a transmitter connected on one side to said aerial circuit at a point removed from said secondaries, and means for adjustably connecting said transmitter on the other side with one of said secondaries, whereby a portion of said secondaries may be short-circuited.

In testimony that I claim the foregoing I have hereunto set my hand.

WILLIAM DUBILIER.

Witnesses:

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