Aug. 10, 1926. 1,595,794

D. G. LITTLE

WIRELESS TELEPHONE SYSTEM

Filed June 30, 1921

Fig. 1.

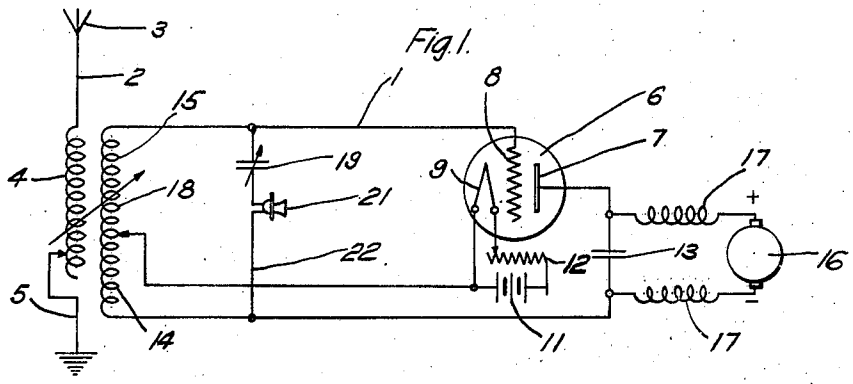
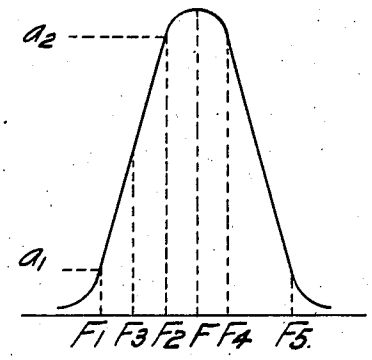


Fig. 2.



WITNESSES:

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UNITED STATES PATENT OFFICE.

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WIRELESS TELEPHONE SYSTEM.

Application filed June 30, 1921. Serial No. 481,461.

My invention relates to signaling systems and more especially to such systems as are adapted to effect the transmission of speech by means of radiant energy.

In its broad aspect, the object of my invention is to provide an improved system of modulation for use in connection with wireless telephone systems whereby the transmission of speech may be more readily effected.

More specifically, the object of my invention is to provide a modulating system of the above indicated character, wherein the radiated energy is modulated in amplitude rather than in frequency.

In the art of wireless telephony, various modulating systems have been proposed for modulating the radio-frequency currents or so-called "carrier currents," in accordance with variations in the intensity of sound waves. One method for accomplishing the desired result has been to vary the amplitude of the radio-frequency currents by controlling the power supplied to the radio-frequency generator in accordance with the varying intensity of the sound waves. Another method has been to vary the effect of an absorbing circuit upon the radiating circuit in accordance with the signal to be transmitted.

I have found, however, that the desired modulation of the radient energy may be obtained by supplying energy to a radiating system which is slightly non-resonant with respect to the impressed energy and then causing the frequency of the impressed currents to approach and recede from the resonant frequency of the antenna circuit in accordance with the varying intensity of sound waves.

Other objects of my invention, as well as details of construction, whereby my invention may be practiced, will be apparent from the following description, taken in connection with the accompanying drawing and claims, wherein;

Figure 1 is a diagrammatic view of a wireless telephone system embodying my invention, and

Fig. 2 is a resonance-curve diagram showing the relation between the intensity of the currents in the antenna circuit, as ordinates, and the frequency of the currents therein, as abscissa.

In the drawing, I have shown one form of variable-frequency oscillation generator whereby my invention may be practiced, though other systems, well known to the art, are equally applicable to my invention. The wireless-telephone system shown comprises an oscillation-generator system 1, which is operatively connected to an antenna system 2. The antenna system 2 comprises an antenna 3, a coupling coil 4 and a ground lead 5.

The oscillation-generator system 1, comprises a thermionic device 6 having suitably disposed therein a plate 7, a grid 8 and a hot cathode 9, the latter being energized by means of a source of energy 11 through a resistor 12. A plate-filament circuit includes a stopping condenser 13, which is of relatively low impedance to high-frequency currents, and a portion 14 of a coupling coil 15. The plate circuit may be energized by means of a direct-current generator 16 through radio-frequency choke coils 17 which are connected across opposite terminals of the condenser 13.

A grid-filament circuit has been shown as including a portion 18 of the coupling coil 15. A condenser 19 and a condenser transmitter 21 are included in a conductor 22 which is connected to opposite terminals of the coupling coil 15. The condenser 19 may be employed for tuning purposes, while the condenser transmitter 21 is employed to modulate the frequency of the high-frequency currents in accordance with the sound waves.

In operation, the coupling between the coils 4 and 18 is adjusted to such value that the resonance curve of the antenna circuit has a single maximum value at the frequency F, as indicated in Fig. 2. The constants of the oscillation generator system 1 are next adjusted to give sharply tuned resonance curves at frequencies lying between the values F_1 and F_2 which frequency band corresponds to the rectilinear portion of the resonance curve of Fig. 2. The condenser transmitter 21 is adjusted to such value that the maximum variations in frequency produced thereby lie between the values F_1 and F_2.

Upon adjusting the frequency of the oscillation-generator system 1 to the value F_3, intermediate the frequencies F_1 and F_2, it will be apparent that the effect of speaking

into the condenser transmitter 21 is to modulate the frequency of the currents which are impressed upon the antenna circuit 2. By reason of the fact, however, that the modulations in frequency approach and recede from the resonant frequency of the antenna circuit, such frequency changes are translated into amplitude variations, thereby admitting of the radiation of energy of substantially constant frequency but of varying amplitude. Thus, for example, upon a change in the frequency of the currents impressed upon the antenna circuit from the F_1 to F_2, the amplitude of the currents contained therein is caused to vary from a_1 to a_2.

While I have shown my invention as employing the rectilinear portion of the resonance curve lying within the frequency band F_1—F_2, it is apparent that similar results would be obtained by employing that portion of the resonance curve lying between the frequency band F_4—F_5 on the other side of the resonant frequency F.

The advantage of my invention resides in the provision of a simple and efficient modulating system for the radiation of energy which is modulated in amplitude rather than in frequency.

While I have shown but one embodiment of my invention in the accompanying drawing, I do not wish to be restricted thereby, but I desire that only such limitations shall be imposed upon my invention as are set forth in the appended claims.

I claim as my invention:

1. In a radio sending system, a generator of oscillations, including a circuit having two opposite reactances and a voice-controlled condenser in series, said circuit presenting small impedance to oscillations of the frequency produced by said generator, and a radiating circuit upon which said oscillations are impressed.

2. In a radio sending system, a generator of oscillations, including a circuit having an inductor, an adjustable condenser and a voice controlled condenser in series, said circuit presenting small impedance to oscillations of the frequency produced by said generator, and a radiating circuit upon which said oscillations are impressed.

3. In a radio sending system, an oscillation generator including a frequency-determining circuit having two condensers in series and means for varying the capacity of one of said condensers in response to sound.

4. In a radio sending system, an oscillation generator of the vacuum-tube type having a feed-back device, an inductor constituting a part of said feed-back device, and a capacity in parallel with said inductor, said capacity including two condensers, one of which varies in response to sound.

In testimony whereof, I have hereunto subscribed my name this 24th day of June, 1921.

DONALD G. LITTLE.