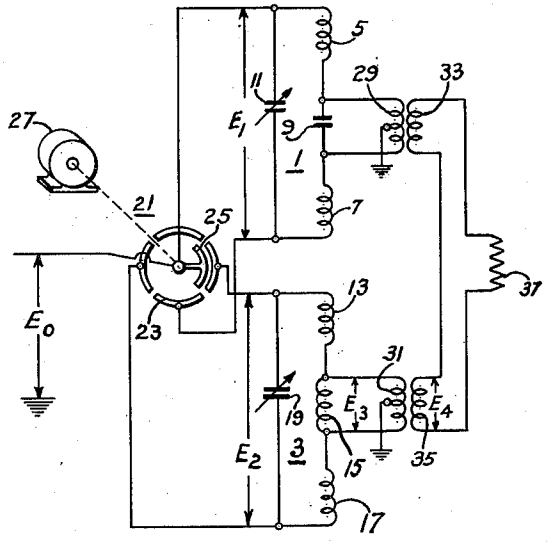
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TRANSMITTER

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WITNESSES:

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TRANSMITTER

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3 Claims. (Cl. 179—171)

My invention relates to a radio transmission system, more particularly to a system of single sideband transmission.

It has for one of its objects to provide a system for modulating a carrier wave and separating one sideband or the other from the carrier and the other sideband.

It is another object of my invention to provide, in a system of modulation having two sets of output terminals and two outputs wherein the modulating frequency is in phase quadrature and wherein the carrier is suppressed, a circuit for eliminating either of the sidebands.

A further object of my invention is to provide a circuit which will deliver power of equal magnitude, with phase displacements of 90°, upon the application of two voltages of equal phase and magnitude to the input circuit thereof.

Another object of my invention is to provide a circuit whereby the frequency of a radio wave may be changed a definite amount without changing the frequency of the wave at its source.

A further object of my invention is to provide a simple circuit for accomplishing the above results.

Systems for the production and transmission of modulated suppressed carrier waves have their application in the prior art, one particular use to which such a system has been applied is in connection with radio beacon transmitters where the problem is to produce directional transmission of sideband waves carrying low frequency or signal frequency modulation and non-directional radiation of the carrier wave and carrier plus voice frequency side bands the source of all waves being common. The system embodying the features of my invention is readily applicable to transmitters for this purpose.

In order to produce a single sideband frequency it is necessary to have available two sources of energy each containg both sidebands and each source having a phase relationship to the other of 90 degrees with respect to both the modulating frequency and the radio frequency. Two such sources can be serially connected to produce either one or the other sideband.

In general, my invention embodies the idea of mechanically modulating a carrier wave and splitting up the energy so modulated into two branch circuits of such design that the outputs thereof when serially connected will produce a single side band of a modulated suppressed carrier wave. The arrangements are such that either the upper or lower sideband may be obtained to the exclusion of the carrier and the other sideband. A more detailed description of my invention will be made in conjunction with the accompanying drawing, wherein

The figure of the drawing comprises a circuit embodiment of my invention.

Referring to the circuit of the figure, we have two separate and independent tank circuits 1 and 3, the one tank circuit 1 comprising a series arrangement of two inductors 5 and 7 and a condenser 9 shunted by a tuning condenser 11, the second tuning circuit comprising a series arrangement of three inductors 13, 15 and 17 shunted by a tuning condenser 19. Thus, the two tank circuits differ from each other, in that one embodies a condenser 9 between the two outer coils 5 and 7 whereas the second tank circuit embodies an inductor 15 between the corresponding two outer coils 13 and 17.

Across the input terminals of each of these tank circuits is impressed a potential E_1 and E_2 respectively at radio frequency, periodically modulated by means of a mechanical modulator 21, which in this instance comprises a condenser having a plurality of plates 23 disposed about the circumference of a circle, and a single rotatable plate 25 pivoted on a motor shaft and adapted to be rotated at any desired speed by the motor 27 thus impressing modulations upon one tank circuit 90 degrees out of phase with the modulation impressed on the other tank circuit.

This rotatable plate is arcuate in shape and is adapted to form a condenser in succession, with each of the stationary plates 23. The source of radio frequency potential E_0 is connected at one end to this rotatable condenser plate whereas the other end is grounded. As the rotatable plate 25 revolves, it alternately couples the source of radio frequency potential E_0 to the tank circuits 1 and 3, reversing the applied potential to each of these tank circuits for every 180° of rotation, thus giving to the energy applied to each tank circuit the characteristics of a modulated suppressed carrier wave, in that each half cycle of modulation will be reversed with respect to the preceding half cycle of modulation.

The output from the first tank circuit is taken off across the condenser 9 and applied to the primary winding 29 of an output transformer, the electrical midpoint of which is grounded.

The output from the second tank circuit is taken off from across the middle inductor 15 and applied to the primary winding 31 of a similar output transformer, whose electrical midpoint is grounded. The secondary windings 33 and 35 respectively of these transformers are connected

in series and applied to a load 37 which, in the practical embodiment of the invention, might comprise an antenna circuit, but which I have disclosed for the sake of simplicity, as comprising a resistive load. It will be found that one or the other of the sidebands of the modulated suppressed carrier wave will appear across the load 37, depending upon whether the secondary windings of the output transformers are connected in series aiding or series bucking relationship.

Consequently, regardless of the character of the load, the system will function to satisfy the objects and purposes for which it was designed, and while I have disclosed one form of my invention in detail, various changes will occur to those skilled in the art. For example, the voltage E_0 may be divided and phased as to the radio frequency, before modulation; and other similar changes might become apparent, once the theory underlying my invention becomes known. I therefore do not desire to be limited to such details except as may be necessitated by the prior art and the appended claims.

I claim as my invention:

1. The method of producing single sideband transmission which comprises alternately impressing modulated carrier energy upon each of two circuit branches and periodically reversing the energy so impressed, and shifting the phase of the high frequency component of said energy in one of said branches 90° with respect to the high frequency component of said energy in the other of said branches, and algebraically adding the energy of both said circuit branches.

2. A system for the production of single sideband energy which comprises a pair of tank circuits, means for periodically and alternately impressing radio frequency energy upon said tank circuits, means for creating a phase difference of 90° between the radio frequency components of energy derived from these tank circuits, and means for serially connecting the energy derived from said tank circuits.

3. In a system for the production of single sideband energy, a pair of tank circuits, each having a reactance shunted by a transformer feeding an output circuit, the said reactances being of opposite sign, said output circuits being connected in series across a load, means for impressing on one said tank circuit a carrier voltage modulated sinusoidally, and means for impressing on the other said circuit a similar modulated carrier voltage in quadrature with said first carrier voltage both as to the carrier frequency and the envelope frequency.

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