

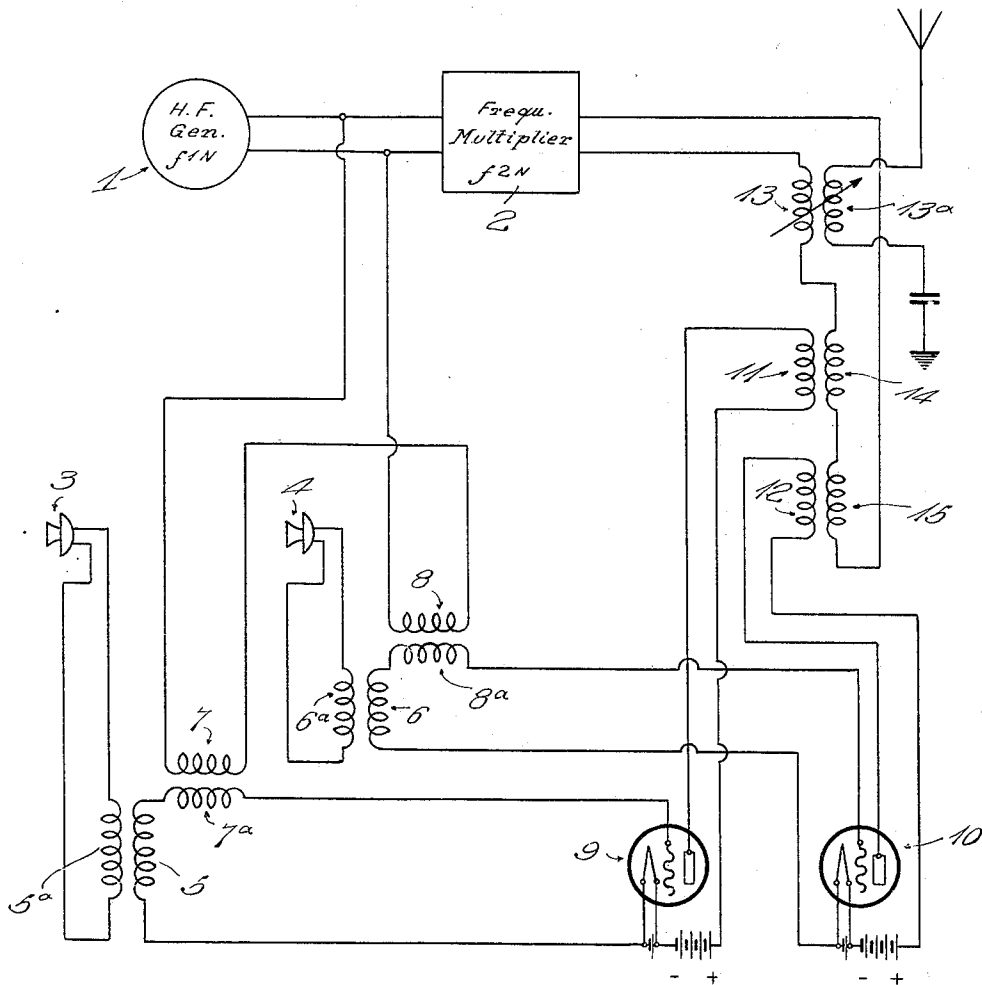
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TRANSMITTING SYSTEM

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UNITED STATES PATENT OFFICE

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TRANSMITTING SYSTEM

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My invention relates to transmitting systems in general and more specifically to continuous wave transmitters.

An object of my invention is to provide a transmitting system wherein the generated carrier energy is modulated with a plurality of signals.

Still another object of my invention is to provide a transmitting system employing a single carrier frequency by means of which a plurality of different sources of audio frequencies are transmitted.

These objects are accomplished by the provision of two 3-element vacuum tubes connected in a series opposing relationship with the modulating frequency source so that only one tube is operative at any one time, the other being biased so negatively on each alternative half cycle of the modulating frequency that it ceases to transmit for that period.

The objects of this invention are somewhat similar to those of my copending application Serial No. 338,146, filed February 7, 1929, for transmitting and receiving systems. In that application, however, a system is shown in which two distinct signals may be transmitted on one carrier wave, the means employed being adapted to establish a potential nodal point in the circuit thereof so that signal modulations may be independently impressed at antinodal points on either side of the node. In this manner the high frequency energy is locally absorbed on one side of the nodal point while being transmitted from that portion of the circuit on the other side of the nodal point.

A better understanding of my invention can be had from the specification following and from the accompanying drawing wherein: The figure is a schematic circuit diagram showing the transmitting system of my invention.

In high frequency continuous wave transmitting systems, thermionic tubes are usually employed in suitable oscillatory circuit arrangements for generating the high frequency electrical energy. This high frequency energy is modulated in accordance with a lower frequency, usually audio frequency, which lower frequency is received at

the receiving station. The high frequency energy is generally referred to as the carrier frequency and it is common to refer to the lower frequency as modulating frequency which is superimposed upon the higher frequency. The relatively narrow allotment of frequency bands available for communication by space radio gives rise to the desirability of either increasing the frequency band or improvements in the apparatus whereby the frequency band occupied by a given transmitting station will be reduced. Other needs created by the demand for selective or secret communication must be satisfied without employing wide bands of frequency and thereby depriving others from the use of these bands. Many systems of multiplexing have been introduced which systems generally have some disadvantages which make the same impractical for adoption. The transmitting system of my invention provides a simple, efficient and inexpensive arrangement whereby a plurality of individual messages or programs may be transmitted by employing a single carrier frequency. A better understanding of the system I employ can be had by referring to the specification following and to the accompanying drawing.

The figure of the accompanying drawing is a schematic circuit diagram of the transmitting system of my invention. A source of high frequency electrical energy 1 having a frequency value of $1n$ is associated with a frequency multiplier 2 adapted to multiply the frequency of the energy from source 1 to a frequency of $2n$. Inductance coils 7 and 8 are connected in series and the series connected with source 1. Inductances 7 and 8 are associated with inductances $7a$ and $8a$ respectively and are adapted to transfer high frequency energy thereto. Inductances $7a$ and $8a$ are connected in series with inductances 5 and 6 respectively. The series connections of inductances 6 and $8a$ comprise the input circuit of thermionic tube 10. The series connections of inductances 5 and $7a$ comprise the input circuit of thermionic tube 9. Thermionic tubes 9 and 8 are illustrated as of the triode type having cathodes, control electrodes and anodes. It is obvious that

thermionic tubes of any suitable design may be employed. Modulating circuit including microphone 3 and inductance 5a is associated with inductance 5. A modulating circuit including microphone 4 and inductance 6a is associated with inductance 6. The output circuits of thermionic tubes 9 and 10 include inductances 11 and 12 respectively. Inductances 11 and 12 are associated with inductances 14 and 15 respectively, the latter two inductances connected in series with inductance 13 and associated with the output of frequency multiplier 2. A load circuit 13a is associated with inductance 13 and may comprise a space radio radiating system as illustrated, a wired radio system or subse-

quent amplifier circuits. The high frequency electrical energy from source 1 is alternating in polarity causing the control electrode of thermionic tube 9 to be supplied with a positive polarity in respect to the polarity of the control electrode of thermionic tube 10. The next instant the control electrode of thermionic tube 9 is supplied with a potential of negative polarity in respect to the polarity of the potential supplied the control electrode of thermionic tube 10. In this manner the control electrodes of thermionic tubes 9 and 10 are alternately and oppositely biased by having their circuits coupled to the high frequency electrical energy circuit so that each tube is rendered inoperative when its grid becomes negatively biased. Thermionic tubes 9 and 10 therefore operate in alternate order. Since individual modulating circuits 3-5a and 4-6a are associated with thermionic tubes 9 and 10 respectively, it follows that the resistance of these tubes is varied first by one microphone and then by the other. It is obvious that microphones 3 and 4 may be replaced by any source of low frequency energy. Inductances 11 and 12, associated with inductances 14 and 15 respectively, absorb certain energy from the output circuit of frequency multiplier 2 and hence reduce the amount of energy in load circuit 13a. Since the carrier frequency is twice that of the modulating frequency in inductances 11 and 12, alternate cycles of the carrier energy are modulated alternately by microphones 3 and 4.

Many modifications of my invention are possible. The accompanying drawing is only representative and it is not intended to limit my invention thereby. The several inductive and electromagnetic relations of the several circuits may be replaced by resistor, impedance and capacity arrangements and other forms of coupling well known to those skilled in the art. It is to be understood that the embodiments of my invention shall not be restricted by the foregoing specification or by the accompanying drawing but only by the scope of the appended claims.

What I claim as new and desire to secure

by Letters Patent of the United States is as follows:

1. A transmitting system comprising in combination, a source of high frequency electrical energy, a plurality of thermionic tubes, means for increasing the internal resistance of said tubes to inoperativeness in alternate order, means for multiplying the frequency of said high frequency energy, the output circuits of said thermionic tubes being associated with said energy of multiplied frequency value and individual modulating circuit arrangements associated with said thermionic tubes.

2. A transmitting system comprising in combination a source of high frequency electrical energy, means for multiplying said frequency, a plurality of thermionic tubes having associated input circuits, output circuits and individual modulating circuits, said input circuits being blocked by said source of high frequency energy alternately by biasing said tubes beyond their operative points said output circuits receiving said modulated frequencies in accordance with the period of operation of said tubes.

3. The method of transmitting two distinct signals on one carrier wave which comprises modulating the positive portion of a high frequency wave by one of said signals, modulating the negative portion of said high frequency wave by the other of said signals, multiplying said high frequency wave to obtain a carrier wave and superposing the modulations obtained in the aforesaid manner upon said carrier wave.

4. A transmitting system comprising a generator of radio frequency energy, a frequency multiplier coupled to said generator, a modulating circuit including a thermionic tube the grid of which is alternately negatively blocked by coupling with radio frequency impulses of one polarity and then made responsive to modulations of audio frequency, a second modulating circuit including a thermionic tube the grid of which is alternately negatively blocked by coupling with radio frequency impulses of the opposite polarity to that which blocks the grid of the first said tube and then made responsive to modulations of audio frequency, said modulations to which said tubes are made responsive being of different origin, and means to superpose said modulations upon the output of said frequency multiplier.

In testimony whereof I affix my signature.
CLINTON W. HOUGH.