May 13, 1930. R. K. POTTER 1,758,058

HIGH FREQUENCY COMMUNICATION SYSTEM

Filed March 1, 1928

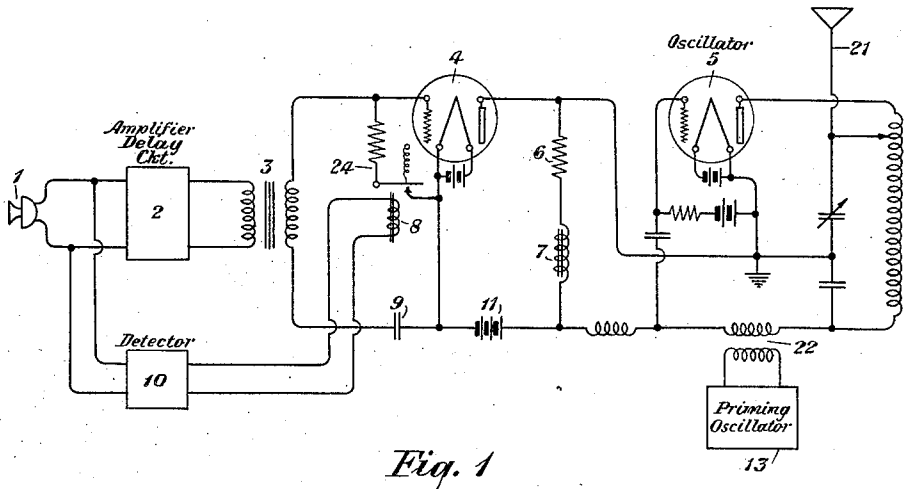


Fig. 1

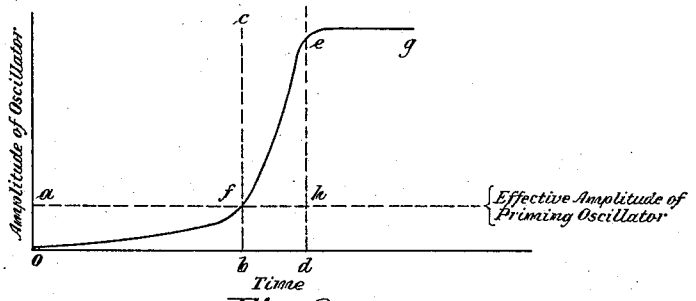


Fig. 2

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UNITED STATES PATENT OFFICE

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HIGH-FREQUENCY COMMUNICATION SYSTEM

Application filed March 1, 1928. Serial No. 258,374.

This invention relates to improvements in high frequency communication systems and more particularly to such systems in which a single carrier channel is utilized for two-way transmission.

In carrier systems designed for two-way transmission over a single frequency band, it has been the practice to completely suppress the transmitter output during the reception period. This is done to avoid interference between the transmitting and receiving branches of the system. One of the methods of accomplishing this transmitter output suppression has been to completely stop the oscillations in the high frequency vacuum tube carrier generator circuits. Such a method has serious defects in that stopping and starting oscillations in this manner causes serious frequency modulation and the oscillations do not build up quickly when it is desired to start transmitting.

In accordance with the arrangements of this invention, it is proposed to overcome the disadvantages of former arrangements by constantly applying a low amplitude priming wave of the transmission frequency to either the grid or plate of the oscillator tube; applying the direct component of plate potential to the oscillator tube only during modulation intervals; and by controlling the functioning of the oscillator tube by means of an auxiliary voice operated device. Other objects and features of the invention will appear more fully from the detailed description thereof hereinafter given.

The invention may be more fully understood from the following description together with the accompanying drawing in the Figures 1 and 2 of which the invention is illustrated. Fig. 1 is a circuit diagram illustrating a preferred form of the invention. In Fig. 2 is shown a curve illustrating the theory of operation of the invention.

In Fig. 1 is shown a telephone transmitter 1 connected through amplifying means 2 and a transformer 3 to the input of vacuum tube 4. A parallel circuit connects the transmitter 1 through the detector 10 to a voice operated relay 8. Normally, the grid of tube 4 is kept negative by the electron accumulation behind the blocking condenser 9. When speech starts, however, the voice operated relay 8 operates and closes the grid biasing circuit 24, thereby bringing the grid to the normal operating potential and allowing tube 4 to function. Connected to the output of tube 4 is the oscillator tube 5, which is of the well known plate modulation type. The plate current supply of the oscillator tube 5 is determined by the IR drop across the resistance 6 and inductance 7. Normally this drop is substantially zero, due to the negative bias of the free grid causing the plate current of tube 4 to approach zero. The resistance 6 is for the purpose of supplying a constant component of IR drop, while the inductance 7 allows a regulation of the modulation level. The oscillator tube 5 will be connected to the antenna circuit 21 in a well known manner. In accordance with the arrangements of this invention, there would be provided a priming oscillator 13 coupled through transformer 22 to the grid of tube 5. The priming oscillator 13 would be a source constantly furnishing a low amplitude wave of the transmission frequency, yet this amplitude must be sufficiently large so as to keep the frequency of the current of oscillator tube 5 in synchronism with that of oscillator 13.

In Fig. 2 there is shown the time-amplitude relation existing when the constants of an oscillatory circuit are suddenly adjusted so that it is capable of sustained oscillation. This time-amplitude relation is shown by the curve (o, f, e). The oscillation will start at (o) due to some circuit disturbance and will build up exponentially to the maximum (g) determined by the tube and circuit characteristics. Between (o, a) and (c, b) the growth will be very slow compared to that between (c, b) and (e, d). In accordance with the arrangements of this invention at the instant the oscillator is made operative, there is present a priming wave to start it off. This is provided by the priming oscillator 13. With this arrangement, the long interval during which the oscillation is slowly building up, may be materially abbreviated. Assuming that the effective amplitude of the

priming oscillation is represented by (a, o), then the time interval for building up the oscillation will be represented by (b, d) as compared to (o, d) for the unprimed circuit.

Further advantages of the priming system of the invention will be apparent when it is noted that, due to the dependence of the unprimed oscillatory type of circuit upon random circuit disturbances to start it off, the transient periods vary erratically. By using a priming wave, the oscillation may be made to build up definitely. Furthermore, in the unprimed circuit frequency modulation is a very serious problem. When the growth of the oscillation is controlled by a priming wave, the frequency may be stabilized.

While the arrangements of the invention have been disclosed as embodied in certain specific arrangements, which are deemed desirable, it is understood that they are capable of embodiment in many and other widely varied forms without departing from the spirit of the invention as defined by the appended claims.

What is claimed is:

1. A high frequency transmitter comprising a modulator, an oscillator tube connected to said modulator and having a normal quiescent state under control of said modulator, and means to continually apply to the grid of said oscillator tube a low amplitude priming wave.

2. A high frequency transmitter comprising a normally inoperative modulator tube, a voice transmitter connected to said modulator, means controlled by said voice transmitter for rendering said modulator tube operative, an oscillator tube connected to said modulator tube and having a quiescent state under control of said modulator, a continuous source of low amplitude waves of a desired frequency, and means to apply said source to an electrode of said oscillator tube.

In testimony whereof, I have signed my name to this specification this 16th day of February, 1928.

RALPH K. POTTER.