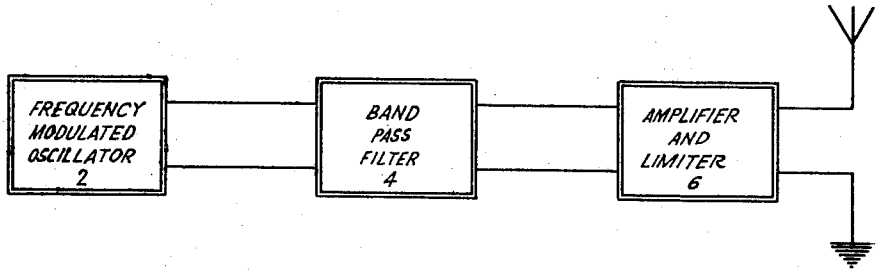
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SIGNALING

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SIGNALING

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This invention appertains to the art of signaling and especially to signaling by frequency modulation.

When signaling by frequency modulation, carrier energy is frequency altered, rather than changed in amplitude, according to signals to be transmitted and the frequency altered wave is subsequently transmitted to a receiving station. At the receiving station the frequency modulated wave is analyzed that is to say, changed into energy of variable amplitude dependent upon the frequency of the received frequency modulated wave. The variable amplitude wave is then demodulated or rectified and translated.

Frequency modulation has many practical advantages, particularly at high frequencies. When signaling by frequency modulation some frequencies, corresponding to the carrier frequency plus or minus harmonics of the modulation frequency, are produced which are not essential to transmission and reception of intelligible signals. They are ordinarily weak in intensity but are strong enough to interfere in other channels. If they are eliminated before transmission interference will be reduced without too great a decrease in intelligibility. Accordingly, to obivate such interference is the prime object of the present invention and it is accomplished by frequency limiting, at the transmitter, the energy to be transmitted so that it occupies only a predetermined band width or channel in the frequency spectrum. More specifically, by adding sharp tuning or a band pass filter to the output circuit of the transmitter, radiation of energy of frequencies beyond the minimum frequency band necessary to transmit intelligible signals is prevented.

Although intelligibilty of the signals is not affected by the elimination of the side bands for the reason that the side bands outside of the desired band of frequencies contain very little energy, the effect of removing them is to introduce a small amount of amplitude modulation, which in the transmission of signals by frequency modulation is objectionable. Therefore, it is a further object of this invention to eliminate the amplitude modulation introduced by frequency limiting the transmitted energy. According to this invention, it is accomplished by amplifying and limiting the frequency limited energy to a constant value.

The novel features which are characteristic of this invention are defined in the appended claims. However, the invention may best be understood both as to its mode of operation and structural organization by referring to the accompanying drawing in which there is disclosed schematically apparatus for frequency limiting frequency modulated energy and for removing any amplitude modulation resulting from the frequency limiting.

Turning to the drawing numeral 2 indicates schematically a frequency modulated oscillator preferably of the type disclosed in my Patent Number 1,787,979, patented January 6, 1931. Connected to the output thereof is a band pass filter 4 of a well known type designed so as to pass only frequencies within the band of frequencies allocated to the transmitter, or within any desired predetermined band. This filter eliminates side bands due to the frequency modulation which would tend to cause interference with stations operating on contiguous frequency channels.

As already pointed out, the use of the band pass filter 4 will introduce some amplitude modulation, and to remove such modulation and the evils attendant thereto there is provided an amplifier and limiter 6, connected to the output circuit of the band pass filter 4. Amplifier 6 is designed to amplify the energy derived from the band pass filter to a constant predetermined value and this is accomplished preferably by the use of electron discharge devices in amplifier and limiter 6 which reach their saturation points for energy of all frequencies supplied by the band pass filter 4. In this manner, the frequency limited energy is amplified to a constant predetermined value and thence radiated or otherwise transmitted by a suitable antenna 8 preferably having a directive characteristic.

The invention having been thus described what I claim is:

1. The method of signaling which includes

frequency modulating energy according to intelligence to be transmitted, frequency limiting the resultant energy so that it occupies at most, only a predetermined band of frequencies in the frequency spectrum, amplifying and amplitude limiting the resultant frequency limited energy and transmitting the resultant energy.

2. In combination a frequency modulation oscillator, a band pass filter connected to the output circuit thereof to limit the frequency width of the resultant energy to a predetermined band in the frequency spectrum, means for amplifying and limiting the amplitude of the resulting frequency limited energy to an amplitude of constant value, and means for transmitting the output of the amplifying and limiting means.

3. In combination, a frequency modulation oscillator, a band pass filter connected to the output circuit thereof to limit the frequency width of the resultant energy to a predetermined band in the frequency spectrum, a combined amplifier and limiter for amplifying and limiting the amplitude of the resulting frequency limited energy to an amplitude of substantially constant value, and, an antenna connected to said limiter amplifier.

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