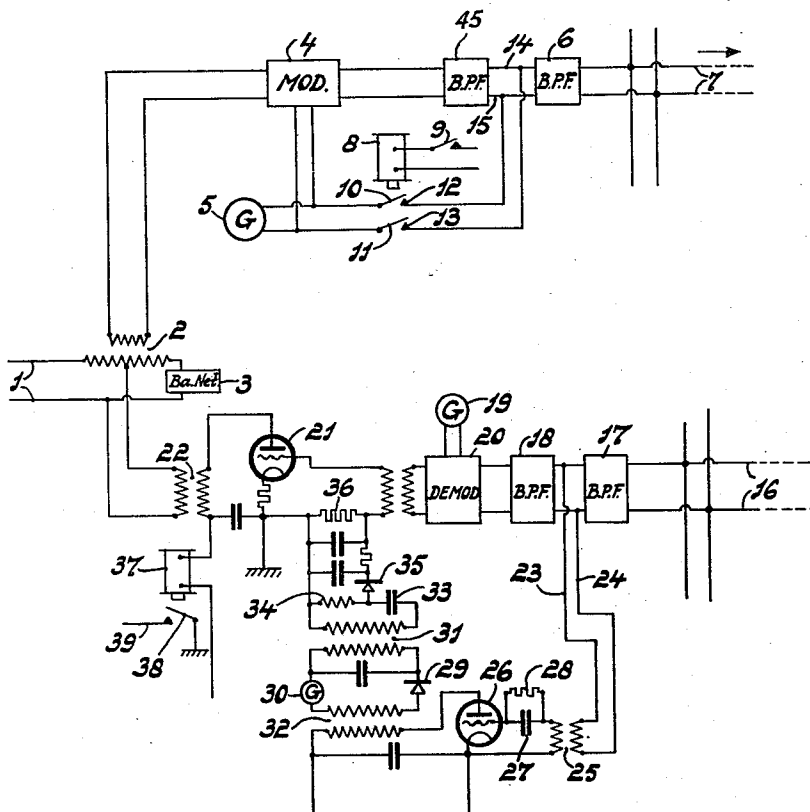


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CARRIER WAVE TELEPHONY

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1 Claim. (Cl. 179—1)

My invention relates to a signal receiver for use in carrier wave telephony systems. More particularly, my invention is concerned with systems in which signals, such as call currents or selective impulses, are sent from one station to another by transmitting a carrier wave which is suppressed during the transmission of conversation, or by a signal current which is included in the conversation side-band.

In such systems the signal is sifted out by including in the corresponding signal receiver, a filter or an oscillating circuit which is tuned to the carrier-wave frequency or to the frequency of the signal current included in the conversation side-band. The signal current which is separated by the above means controls, through a rectifier, a suitable relay which in turn controls the signal circuit.

I have found that in such systems there is danger that false responses may be caused in the signal circuit by oscillations which occur during the transmission of the conversation and whose frequency is the same or close to that of the signal current.

The object of my invention is to overcome the above difficulty, and for this purpose I provide amplitude limiting means in the input circuit of the signal receiver.

These means, which preferably comprises a grid-controlled electron tube whose grid circuit includes a condenser and a leakage resistance, has the further advantage that it allows a smaller amplitude difference between the amplitude of the signal current and the mean amplitude of the conversation side-band.

In order that the invention may be clearly understood and readily carried into effect, I shall describe the same in more detail with reference to the accompanying drawing, in which the single figure is a schematic diagram of a portion of a carrier-wave telephone system comprising a signal receiver according to the invention.

In the system shown in the drawing, in which the signals are transmitted by the emission of a carrier wave which is suppressed during the transmission of conversation, the conversation to be transmitted is received through the lines 1 and is supplied in the usual manner through a differential transformer 2 with a diagrammatically-indicated balancing network 3, to a modulator 4. The speech currents are modulated by modulator 4 on a carrier wave of frequency f which is produced by a high-frequency generator 5.

Modulator 4 is designed so that the carrier wave produced by generator 5 is suppressed, and

that there will be only two side-bands. After passing through a band pass filter 45 and conductors 14 and 15 one of these side-bands is suppressed in a band-pass filter 6 and supplied to a transmission line 7. Additional similar transmission channels may of course be connected to line 7.

To provide for the signaling, a relay 8 is provided. This relay has its coil connected through a single-pole switch 9 to a suitable voltage supply (not shown), and has two single-throw, normally-open armatures 10 and 11 adapted to engage fixed contacts 12 and 13 respectively. The heels of armatures 10 and 11 are connected to the terminals of generator 5, and the contacts 12 and 13 are connected to conductors 14 and 15. Thus, by closing and opening switch 9, calling or selective impulses supplied by generator 5 are impressed upon the line 7.

The carrier-wave conversation received through line 16 is separated from that of the other channels by means of band-pass filters 17 and 18. Together with a carrier wave of frequency f_1 , produced by a high-frequency generator 19, this conversation is demodulated in a demodulator 20. The demodulated current is amplified by a triode 21 and the amplified current after being transformed by a transformer 22, is supplied as low-frequency speech current to line 1. Controlled by the anode current of tube 21 is a relay 37 having a single-throw normally-closed armature 38 which controls the signal circuit 39.

The signal impulses of the carrier frequency f_1 , which come in over line 16, are supplied through conductors 23 and 24 and a transformer 25, to a triode 26. The grid circuit of tube 26 comprises a condenser 27 shunted by a leakage resistance 28, and therefore this tube acts as an amplitude limiter since in the presence of grid currents the grid bias is shifted, in accordance with the maximum amplitude of the oscillations supplied to the grid circuit (thus also signal currents or conversation side-band), toward the negative to such an extent as to keep the maximum anode current substantially constant.

Coupled to the anode circuit of tube 26 through a transformer 32 is a mixing circuit comprising a rectifier 29, an auxiliary high-frequency generator 30 of a frequency f_2 , and the primary winding of a transformer 31. Connected across the secondary winding of transformer 31 is an oscillatory circuit comprising a condenser 33 and an inductance coil 34, which circuit is tuned to a frequency f_3 equal to the difference between the frequencies of generator 30 and 19, i. e. $f_3 = f_2 - f_1$.

The voltage set up across inductance coil 34 is rectified by a rectifier 35 and applied across a resistance 36 in the grid circuit of tube 21. The voltage drop produced in the grid circuit of tube 21 is in such a direction that the anode current of the tube is greatly suppressed or reduced to zero. As a result, relay 37 is deenergized and a signal impulse is produced.

When signal currents are received there is no conversation side-band, and thus the amplitude of the signal current in the anode circuit of the limiter tube 26 corresponds to the above-mentioned constant value of the anode current. This current is sufficient to cause relay 37 to pick up armature 38 and interrupt the signal circuit 39.

During the reception of the conversation side-band, which is composed of a plurality of frequencies, the amplitude of each of the separate frequencies in the anode circuit of the limiter tube 26 may be a fraction of the above-mentioned constant value of the anode current. A disturbing side-band frequency consequently can produce only an anode current which is considerably smaller than the anode current which occurs in

the reception of the signal current. As a result, the possibility of false responses in the signal circuit is eliminated, or at least greatly reduced.

While I have described my invention with reference to a specific example, I do not wish to be limited thereto but desire the appended claims to be construed as broadly as permissible in view of the prior art.

What I claim is:

A carrier wave receiving circuit comprising a main channel responsive to intelligence conveyed by suppressed carrier modulated waves and including a demodulator, a side channel derived from the main channel at a point before the demodulator and responsive to additional signals transmitted by the transmission of the carrier wave, a frequency selective circuit in said side channel for filtering out the additional signals, and amplitude limiting means in said side channel, said side channel being supplied with the additional signals during the signalling and with suppressed carrier modulated waves during the transmission of intelligence.

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