

May 28, 1946.

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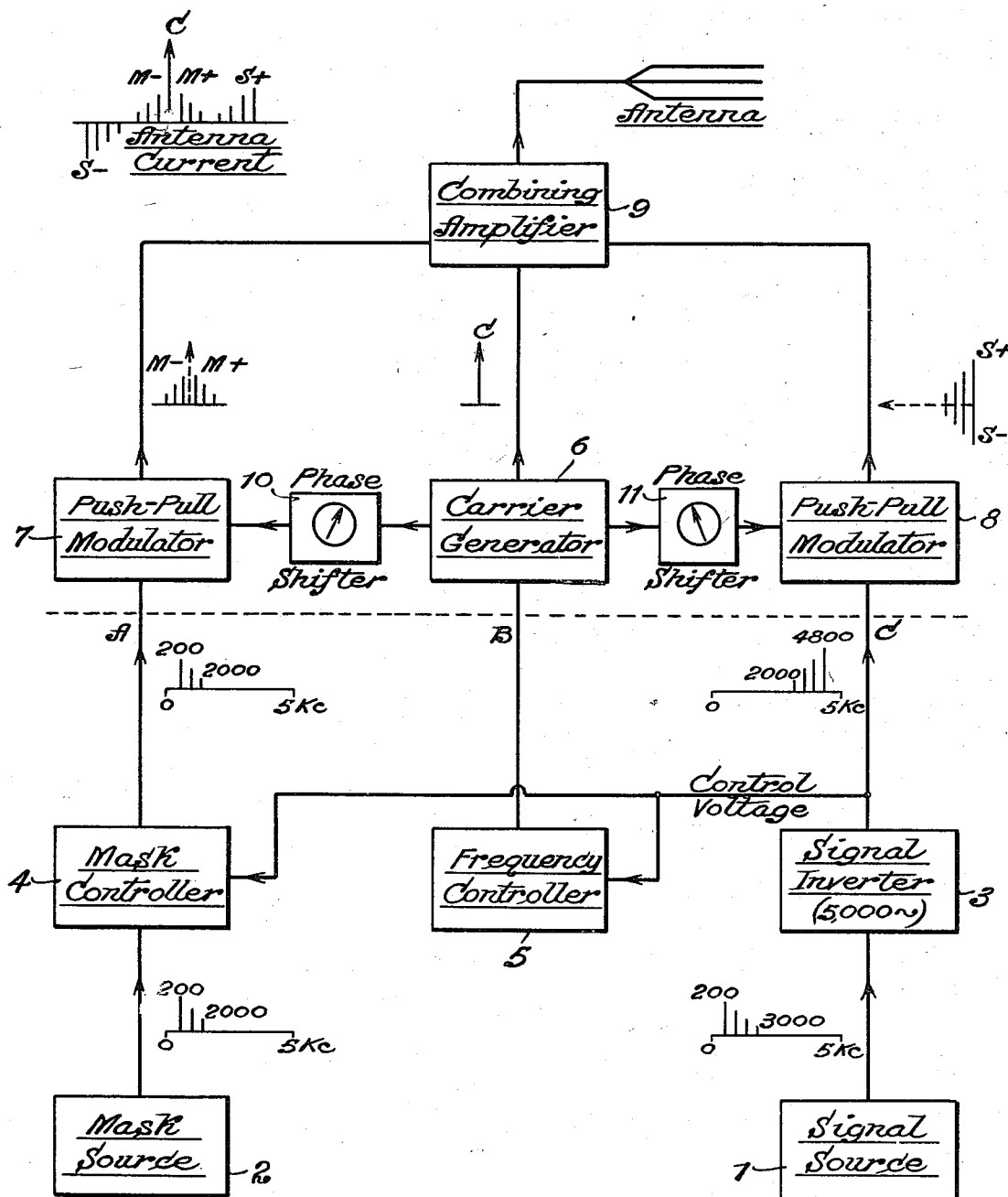
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PRIVACY SIGNALING SYSTEM

Filed Jan. 24, 1942

3 Sheets-Sheet 1

Fig. 1.



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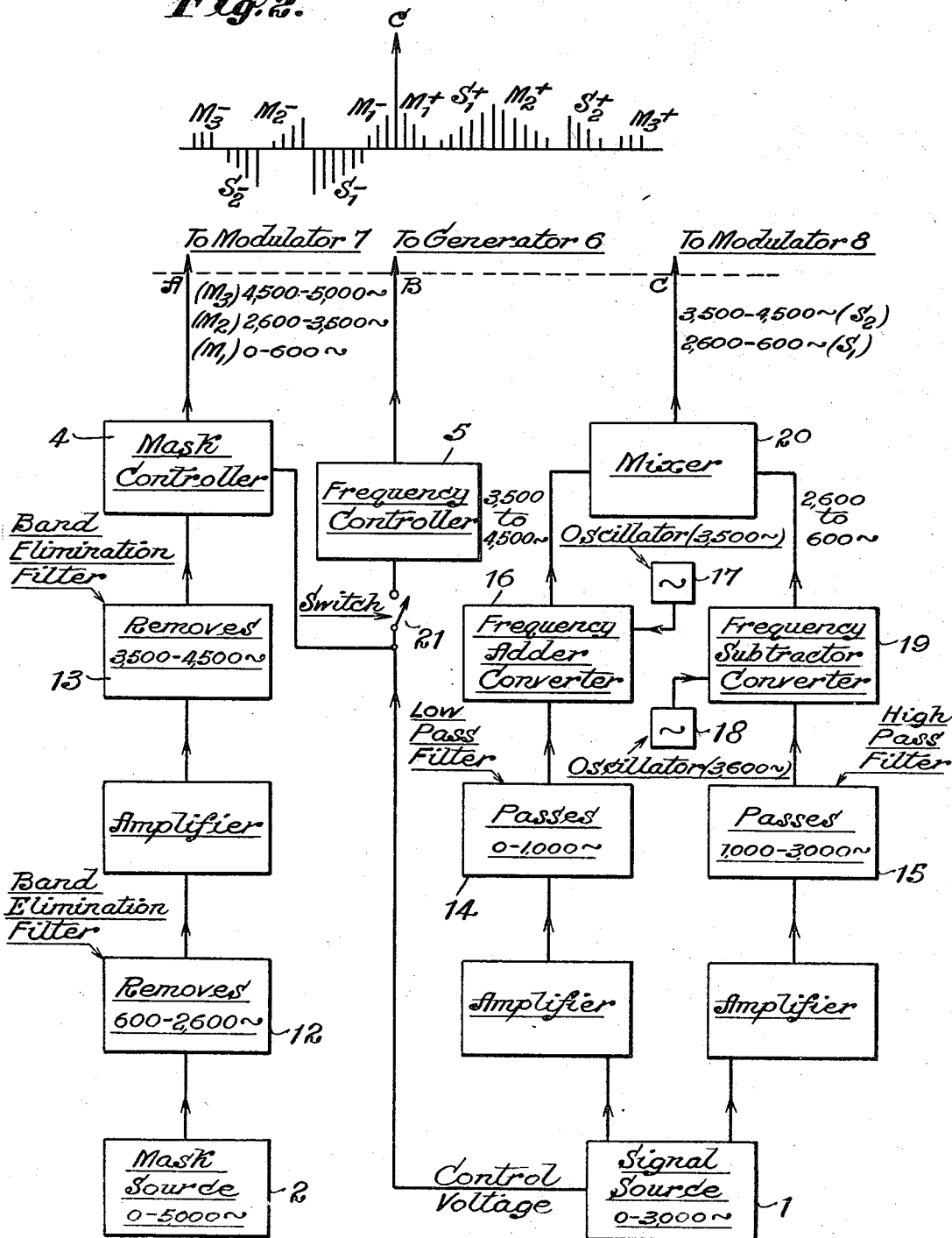
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3 Sheets-Sheet 2

Fig. 2.



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3 Sheets-Sheet 3

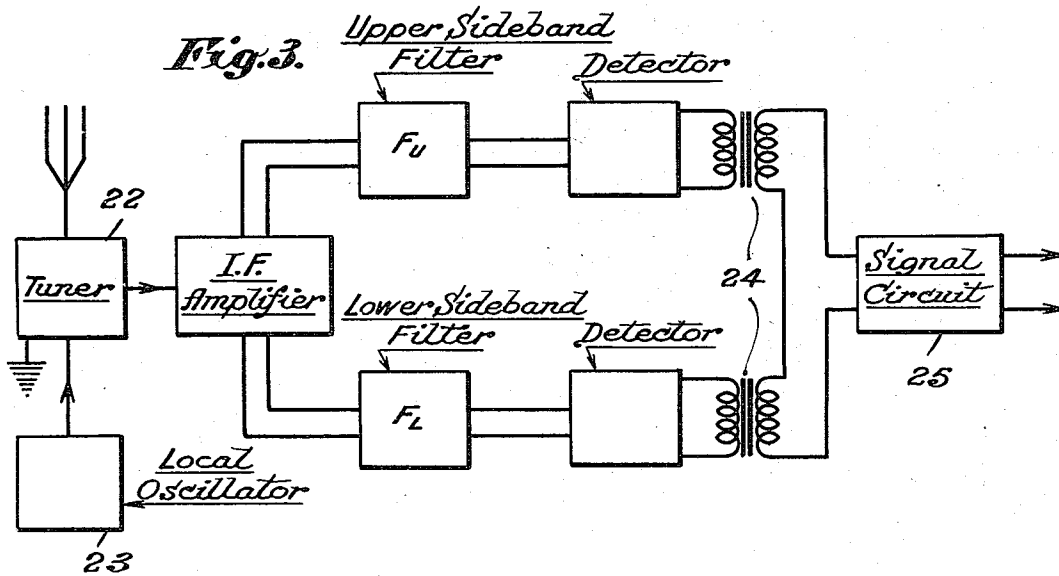


Fig. 4.

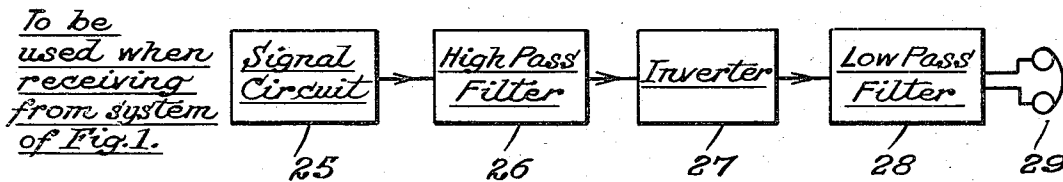
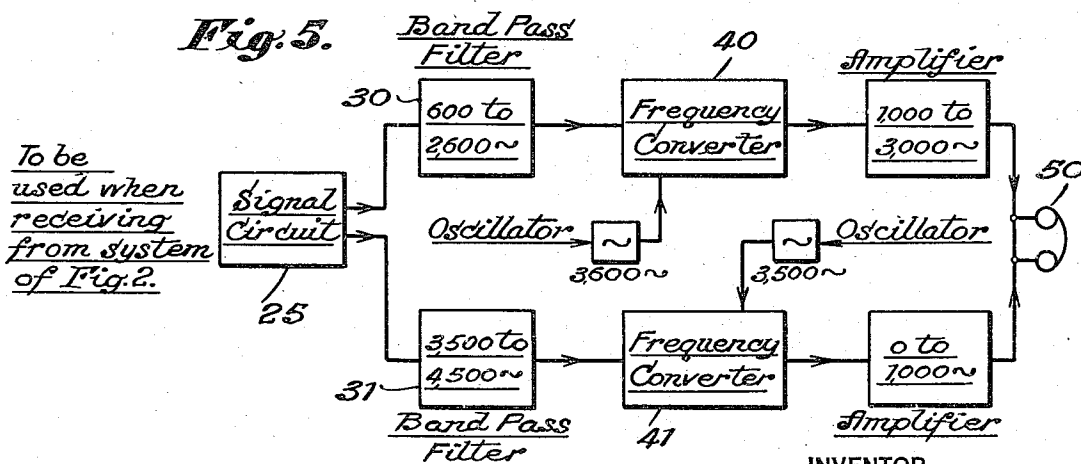


Fig. 5.



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PRIVACY SIGNALING SYSTEM

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Application January 24, 1942, Serial No. 428,056

21 Claims. (Cl. 179—1.5)

My present invention relates to privacy signaling systems, and more especially to improved privacy systems of radio telephony of the type using masking signals.

An object of this invention is to provide an improved type of privacy radio telephony, in which it will be difficult for an unwanted observer to note that privacy telephone is being practiced.

Another object is to mislead the observer if he believes privacy telephone is being practiced, and cause him to draw false conclusions as to the broad principles of operation.

A further object is to make it difficult for an observer who fails to be misled, to analyze the details of the principle of operation and to construct the proper type of receiver for intelligible reception.

In U. S. Patent 1,642,663 to E. L. Chaffee, it was taught that privacy radio telephony can be achieved by causing a carrier to be modulated at frequencies differing from the speech frequencies, and by frequency modulating the carrier in an artificial manner. The former process prevented reception by usual broadcast type receivers, and the latter by continuous wave type receivers. It is, also, known that a masking signal may be transmitted together with the message signal to aid in preventing the reception of signals indicating privacy is being practiced, as taught in U. S. Patent 2,204,050 to Purington.

The present invention provides that a masking signal shall be sent, with the option of causing the masking signal to be present only when the message is being sent. This is for the purpose of better concealing the message, and, also, for suggesting that the masking signal is a chopped part of a privacy message, of which the other portion is sent by some other channel.

It further provides for the option of sending the message on a "quasi-phase" modulation basis, as explained in U. S. Patent 2,020,327 to Purington, while the masking signal is sent on an amplitude modulation basis, thereby reducing the ratio of signal energy to masking energy that results when the entire radiation is received by the usual amplitude modulation receiver, without, however, impairing the signal as properly received by a timing modulation receiver.

It further provides the option of interleaving the signal and masking modulations in such a manner that the radiated side bands due to the signal modulation are closely adjacent to, and carefully guarded by, the side bands due to the masking modulations. This, also, results in

great difficulty of analysis of the nature of the transmission, and makes it necessary to use a high degree of technical skill to construct a suitable receiver for intelligible reception.

Finally, the present invention provides that the carrier need not be artificially frequency modulated for the purpose of preventing reception of the message by continuous wave receivers; or if it is frequency modulated for such purposes, that the modulator shall not be of the artificial nature prevalent in the art, but in accordance with the presence and nature of the amplitude or "quasi-phase" modulations of the carrier due to the signal or mask thereby preventing identification of the radiations as being related to a privacy type.

The novel features which I believe to be characteristic of my invention are set forth with particularity in the appended claims; the invention itself, however, as to both organizations and methods of operation will best be understood by reference to the following description taken in connection with the drawing in which I have indicated diagrammatically several circuit organizations whereby my invention may be carried into effect.

In the drawings:

Figure 1 schematically shows a transmitter useful when the mask and signals are of an integral type, without interleaving;

Figure 2 shows in schematic manner a transmitter modification useful when the mask and signals are interleaved;

Figure 3 shows in schematic form the general receiver arrangement useful when the signals are sent by "quasi-phase" modulation;

Figure 4 shows schematically an additional receiver arrangement for use when the signal is integral, as in Figure 1;

Figure 5 shows an additional schematic receiver arrangement useful when the signal is divided, as in Figure 2.

It will be understood that the circuit arrangements to be described are for illustration only. Frequency indications are not definite, but can be organized otherwise. For example, the audio sources for the frequency converter circuits can be both the same and derived from a common source. Since in my aforesaid U. S. Patent 2,204,050, there are shown the circuit details of a general privacy system of the masking signal type, such circuit details will not be repeated here. Those skilled in the art will be able fully to understand the schematic disclosure. In Figure 1 there is provided a signal source 1, such

as a microphone and amplifier, providing audio signals, for example in the audio frequency range of 200 to 3,000 cycles. There is provided a masking source 2, such as a phonograph or microphone with amplifier, providing masking frequencies, for example in the audio frequency range of 200 to 2,000 cycles. The signal frequencies are impressed upon a signal inverter 3 containing a local audio oscillator source operating at say 5,000 cycles. As shown in my aforesaid U. S. Patent 2,204,050 the signal frequencies and local oscillations are applied to a balanced modulator whose output would contain solely the original input in inverted form. That is, a 260 cycle signal produces a modulating frequency of 4,800 cycles, and a 3,000 cycle signal produces a modulating frequency of 2,000 cycles. The local oscillation is suppressed in the balanced modulator output.

On the other hand, the masking signals in original form are impressed upon a mask controller 4. The transmission of electrical energy through controller 4 is under the electrical control of other electrical energy corresponding solely to the original input but in inverted form. In the case shown the controller 4 is under the control of audio energy existing in the output of the signal inverter. Such devices are well known in the art and need not be shown in detail. The controller could consist, for example, of an amplifier normally biased to prevent passage of mask signals. Passage of the masking signals would be permitted by a rectifier means operating from the control signals to vary the gain characteristics of the amplifier for the controlled (mask) signal. In the present case the control signal is preferably derived from the output of the signal inverter, instead of from the output of the signal source, completely to minimize the possibility of the message signals getting into the masking channel and thereby cause a loss of privacy.

A frequency controller 5 for the generator of carrier energy is provided. The controller 5 is actuated from the output of the signal inverter. It could be controlled, if desired, by the output of the mask controller, or in any other manner, provided it results in the carrier frequency being controlled by the frequency and strength characteristics of the signal or signal and mask source to give a random frequency pattern, preferably with the frequency not changing when the signal source is not actuated. The mechanism for producing the frequency variation of carrier generator 6 may be, for example, a variable condenser in the tuned circuit of the carrier generator, with electro-mechanical means for changing the capacity in accordance with currents developed by rectifying the control energy from the signal inverter 3.

As a result, referring to the dotted line, modulating current in the range of 200-2,000 cycles in accordance with the mask source passes through junction A when the signal source is operated. The frequency of the currents and voltages at junction B is modulated at slow, or syllabic, frequency rates in accordance with the energy and frequency characteristics of the signal source, or of the mask source as controlled by the signal source, or both. And, finally, a modulating current in the range of 4,800 to 2,000 cycles passes through junction C. As explained previously that range corresponds to a signal source current in the lower and inversely arranged range of 200-3,000 cycles. It will be understood these figures are employed for illustra-

tion only. There is no overlap or spread indicated for the modulating frequencies through A and through C, and it will be understood that the system will be operative even if there is an overlap; possibly of very considerable extent if the two modulations are of different types. There is depicted, in a purely pictorial manner, the various audio frequencies at different points of the system.

The radio transmitter itself, shown above the dotted line, includes the carrier generator 6, the frequency of which is under the control of the frequency controller 5, flanked on both sides by push-pull modulators 7 and 8 for the masking and signal channels respectively. The carrier generator may produce oscillations at any desirable radio frequency. Energy from the carrier generator passes directly to a combining amplifier 9, and, also, through adjustable phase shifter networks 10 and 11 to the push-pull modulators 7 and 8 respectively. The outputs of the modulators also pass to the combining amplifier. The phase shifter 10 for the mask channel may be so adjusted that the result of combining the side bands, due to the masking push-pull modulator, with the carrier in the combining amplifier represents amplitude modulation. In other words, in the output of the modulator 7 there will exist solely mask side bands M- and M+ corresponding to the 200 to 2,000 cycle audio range. The carrier (shown as a dotted vertical line) is suppressed in the modulator output circuit. The phase shifter 11 for the signal channel may be so adjusted that the result of combining the side bands, due to the signal push-pull modulator, with the carrier in the combining amplifier represents "quasi-phase" modulation.

Here, also the S- and S+ side bands exist in the output circuit of the push-pull modulator 8 with carrier suppressed. In this case, unlike modulator 7, the carrier is phased to be in quadrature with the vector sum of modulation side bands S- and S+. This is "quasi-phase" modulation. This process, described in U. S. Patent 2,020,327 to Purington, referring to U. S. Patents 1,935,776 and 1,976,393 to John Hays Hammond, Jr., is now well known in the art, and is believed to require no detailed description. As shown, there is fed to the combining amplifier 9, which may be of any well known construction, the carrier energy from generator 6, the mask side bands from 7 and the signal side bands from 8. The phase relations between these components are depicted under amplifier 9. As a result there is developed in the antenna, as indicated graphically to the left of amplifier 9, a carrier C which is amplitude modulated by the masking signals to produce the masking side bands M- and M+ and which is also "quasi-phase" modulated at higher frequencies derived from the signal frequencies to produce the signal side bands S- and S+. By virtue of the action of frequency controller 5, the radiation as a whole is shifted in frequency whenever the carrier conveys a signal.

Phase shifters 10 and 11 could be adjusted in practice by applying a monitor to the radiated output. With the input C silent so that S+ and S- are absent, phase shifter 10 would be adjusted so that the radiation is amplitude modulated only involving the carrier C and the modulation side bands M. Then with input A silent so that modulation side bands M are absent, phase shifter 11 is adjusted so that the radiation is "quasi-phase" modulated. These radiations could be checked by receivers built for the purpose.

It is to be clearly understood that no frequency changes occur in the combining amplifier 9. The modulations from the output of modulators 7 and 8 are phased as shown in the drawing. The essential function of the combining amplifier is to put the components C, S+, S-, M+, M- on the same antenna or line.

In the modification of Figure 2, the radio circuit arrangements are substantially the same as for Figure 1, and need not be repeated. The masking source 2 may provide audio energy in the range up to 5,000 cycles. Successive band elimination filters 12 and 13 are employed to extract, or remove two bands of frequencies, say 600-2,600 cycles and 3,500-4,500 cycles so that the carrier will not be amplitude modulated by frequencies in these ranges, but can be quasi-phase modulated in these ranges due to signals from the signal source. The mask controller 4 is inserted in the line to the modulator 7.

The output of signal source 1 is diverted to two channels by isolating amplifiers and filters, creating one band of 0-1,000 cycles and another band of 1,000-3,000 for example. This may be done by passing the signals through an amplifier followed by a low pass filter 14 which passes energy of 0 to 1,000 cycles. Another portion of the signal energy is applied to a high pass filter 15 which passes a band of 1,000 to 3,000 cycles. The 0-1,000 cycle band is introduced into a frequency adding converter 16 with oscillations from a local oscillator source 17 operating at 3,500 cycles. As a result of the conversion at 16, the zero frequency is elevated to 3,500 cycles, while a signal current of 1,000 cycles is converted over into 4,500 cycles modulating current. It is, of course, possible to make this frequency adder circuit a frequency subtractor, using a local source of 4,500 cycles and yielding the same output band of 4,500 to 3,500 cycles. The other signal band of 1,000-3,000 cycles is similarly subjected to conversion into a range of 2,600 to 600 cycles. For this conversion there is used an oscillator 18 operating at 3,600 cycles. The oscillations are fed to the frequency subtractor converter 19. The output of the latter has a range of 2,600 to 600 cycles. The two bands S₂ and S₁ are applied to a conventional mixer 20. The output of the mixer comprises signal currents in two bands of modulating currents, these bands being in the same ranges as the bands eliminated from the masking source. As shown, the masking bands M₁, M₂ and M₃ are for 0 to 600 cycles, 2,600 to 3,500 cycles and 4,500 to 5,000 cycles.

After the modulation and combining as shown above the dotted line in Figure 1, the radiations for Figure 2 are for a carrier modulated by a masking source as to amplitude, creating masking sidebands M₁, M₂, M₃; and modulated by message conveying signals as to phase, creating signal side bands S₁ and S₂, with the masking and signal side bands interleaved. At the top of Figure 2 there is shown pictorially the nature of the radiation from the antenna of the system of Figure 2. The same convention is here employed as in Figure 1. It will be clear from this graph that the mask and signals are interleaved, and that the S side bands are quasi-phase modulated. For this arrangement of Figure 2, the use of the frequency controller 5 for the carrier is not as necessary as for Figure 1, but can be used by closure of the switch 21 by which it can be energized from the signal source, before or after conversion.

It is noted that all the radiations of Figure 1 or

Figure 2 exist simultaneously, and that the masking bands will produce a considerable degree of intelligibility of a chopped nature, but that there will neither be intelligibility nor appreciable noise from the signal bands in the usual amplitude modulation receivers. The natural inference will be that the masking bands are part of a privacy message, chopped up into syllabic lumps of modulations, and the remainder transmitted by some other radio or other channel. As a result, the actual message conveyed by the signal bands may be entirely overlooked. The proper type of receiver, when the mask and signal are sent one by amplitude and the other by "quasi-phase" modulations, which is the preferred arrangement, is shown schematically in Figure 3. The latter is to be understood as supplemented by Figure 4 for transmissions by the system of Figure 1. Figure 3 is supplemented by the system of Figure 5 for transmissions by the system of Figure 2.

In Figure 3 is provided the usual tuner 22 and heterodyne local oscillator 23 for creating intermediate frequency (I. F.) signals. A split circuit is employed, with the upper sideband filter F_u energized in accordance with the upper sideband energy of the transmitted energy, and the lower sideband filter F_l energized in accordance with the lower sideband energy. Both of these channels are provided with individual detectors. The detectors are provided with combining means 24 so that additive effects are produced in the signal circuit 25 due to the "quasi-phase" modulation, and subtractive effects are produced therein due to the amplitude modulation. This is the well known frequency discriminator circuit described in U. S. Patent 1,776,065 to E. L. Chaffee, and U. S. Patents 1,935,776 and 1,976,393 to John Hays Hammond, Jr., and need not be described further in detail.

For the radiation of Figure 1, the energy of the signal circuit 25, as shown in Figure 4, may be passed through a high pass, or band pass, filter 26 to remove any audio currents due to the amplitude modulation signals. The remaining audio currents, representing the S components, are then passed through an inverter circuit 27, and, if desired, through a following low pass filter 28 to actuate the indicating headphones 29 in accordance with the message. The high pass filter 26 would be designed to pass all the audio frequencies above 2,000 cycles. The inverter 27 could be of the same type as inverter 3 of Figure 1, but would act to invert the 2,000 to 4,800 cycle range to the original 200 to 3,000 cycle range. The low pass filter 28 would be designed to cut out all audio frequencies above 3,000 cycles.

To receive the radiation of the system of Figure 2, the energy of the signal circuit, as shown in Figure 5, may be split into two channels by band pass filters 30 and 31 which respectively transmit 600 to 2,600 cycles and 3,500 to 4,500 cycles for example. The separate frequency converters 40 and 41 respectively change the signals from 30 and 31 back into the original signal ranges of 1,000 to 3,000 cycles and 0 to 1,000 cycles, which may then be amplified and combined to actuate the headphones 50. It will be noted that the process is the reverse of the process in Figure 2 between source 1 and mixer 20. The extent of frequency modulation of the carrier to conceal reception by a continuous wave receiver is not sufficiently great to disturb the proper reception of the signals.

The arrangements here shown may, of course,

be extended to yield other arrangements, as for example by providing for the changing of transmitter and receiver channels, filters, etc. synchronously, or from time to time to yield even a greater degree of privacy.

While I have indicated and described several systems for carrying my invention into effect, it will be apparent to one skilled in the art that my invention is by no means limited to the particular organizations shown and described, but that many modifications may be made without departing from the scope of my invention, as set forth in the appended claims.

What I claim is:

1. A method of imparting a high degree of secrecy to signals desired to be transmitted between two points, which method consists in producing a carrier wave, amplitude modulating the carrier wave in accordance with a false or masking set of signals and phase modulating the carrier wave in accordance with the true set of signals, transmitting the resultant carrier and upper and lower sets of side bands, intercepting the transmitted energy at a receiving point, producing from the intercepted energy, a current representative of the carrier and upper set of side bands and a current representative of the carrier and lower set of side bands, detecting the two produced currents and subtracting one from the other to derive therefrom the desired or true set of signals.

2. A method of imparting a high degree of secrecy to signals desired to be transmitted from one point to another, which method consists in producing a carrier wave, producing a band of audio frequencies representative of a false or masking set of signals, producing another band of audio frequencies representative of the true set of signals desired to be transmitted, converting the last named band of audio frequencies to another band of related audio frequencies, amplitude modulating the carrier wave in accordance with the first named band of audio frequencies, phase modulating the carrier wave in accordance with the converted band of audio frequencies, transmitting the resultant carrier and upper and lower sets of side bands, intercepting the transmitted energy at a receiving point, producing from the intercepted energy a current representative of the carrier and upper set of side bands and a current representative of the carrier and lower set of side bands, detecting the two produced currents, subtracting one of the resulting detected currents from the other thereof to produce a current representative of the converted band of audio frequencies and reconvertng the resulting energy to derive therefrom the true set of signals.

3. A method of imparting a high degree of secrecy to signals transmitted between two points, which method consists in generating a carrier wave, producing a band of audio frequencies representative of a false or masking set of signals, producing another band of audio frequencies representative of the true set of signals desired to be transmitted, frequency inverting the last named band of audio frequencies, amplitude modulating the carrier wave in accordance with the first named band of audio frequencies, phase modulating the carrier wave in accordance with the inverted band of audio frequencies, transmitting the resultant carrier and upper and lower sets of side bands, intercepting the transmitted energy at a receiving point, producing from the intercepted energy a

current representative of the carrier and upper set of side bands and a current representative of the carrier and lower set of side bands, detecting both of the produced currents and subtractively combining the resultant detected currents to produce therefrom a current representative of the inverted band of audio frequencies, reinverting the resulting currents and deriving from the resultant currents the desired set of signals.

4. A method of signaling which consists in generating a carrier wave, producing a band of audio frequencies representative of a first set of signals, producing another band of audio frequencies representative of a second set of signals, simultaneously frequency inverting and converting said last named band of audio frequencies to another band of frequencies, amplitude modulating the carrier wave in accordance with the first named band of audio frequencies, phase modulating the carrier wave in accordance with the converted and inverted band of frequencies, transmitting the resultant carrier and upper and lower sets of side bands, intercepting the transmitted energy at a receiving point, producing from the intercepted energy a current representative of the carrier and upper set of side bands and a current representative of the carrier and lower set of side bands, detecting both of said produced currents, subtractively combining the resultant detected currents, deriving therefrom a current representative of the converted-inverted band of frequencies and simultaneously reconvertng and reinverting the resultant current, and deriving from the resultant current the second set of signals.

5. In a privacy telephonic communication system, the method of imparting a high degree of secrecy to signals desired to be transmitted from one point to another, which consists in producing a carrier wave and two sets of signals, one of said sets of signals comprising the true signals, the other comprising masking signals, amplitude modulating the carrier wave by the masking signals and simultaneously "quasi-phase" modulating the carrier wave by the true signals, transmitting the modulated carrier wave, intercepting the transmitted energy at a receiving point, detecting the intercepted energy to derive therefrom the two modulation components, separating the upper and lower side bands of each of the two signal components, producing direct current components from each of the side bands and combining the produced two direct current components in additive phase to produce the desired signals therefrom.

6. A receiving system for multiplex telephonic systems of the type wherein a carrier wave is "quasi-phase" modulated by one set of signals and amplitude modulated by another set of signals, comprising in combination means for intercepting the modulated carrier wave, a source of local oscillations, means for changing the incoming oscillations to an intermediate frequency modulated in accordance with both sets of signals, a pair of filter circuits, means for impressing said intermediate frequency upon both said circuits, one of said circuits being adapted to pass the intermediate frequencies and frequencies above the intermediate frequency and the other thereof the intermediate frequencies or frequencies below said intermediate frequency whereby one of said circuits passes substantially only the intermediate frequency and the upper side bands of said signal modulations and the

other only the intermediate frequency and the lower side bands thereof, a pair of detector tubes having separate input circuits, one of said input circuits being coupled to the output of said one of said filter circuits, the other of said input circuits being coupled to the output of the other filter circuit, output circuits for each of said detector tubes including a common portion, a signal utilizing circuit coupled to said common portion for deriving one of said signals, and a utilizing circuit coupled to both said output circuits for deriving the other signals.

7. A method of multiplex telephony which consists in producing a carrier wave, amplitude modulating the carrier wave in accordance with signals desired to be transmitted, phase modulating the same carrier wave in accordance with other signals desired to be transmitted, receiving the modulated carrier, producing an intermediate frequency carrier having upper and lower side bands by combining the received carrier with locally produced oscillations, diverting a portion of the intermediate frequency carrier and the upper side bands to one channel and another portion of the intermediate frequency carrier and lower side bands to another channel, separately detecting the diverted energies and deriving one set of signals by addition of the detected energies and the other set of signals by subtraction of the detected energies.

8. In a method of privacy communication wherein a masking, or false, signal is transmitted by amplitude modulation of a carrier wave and a message, or true, signal is transmitted by phase modulation of the same carrier; the improvement which includes the step of normally preventing the said amplitude modulation in the absence of said message signal, and automatically providing said amplitude modulation in response to said message signal.

9. A method of multiplex telephony which consists in producing a carrier wave, amplitude modulating the carrier wave in accordance with one set of signals desired to be transmitted, phase modulating the carrier wave in accordance with another set of signals desired to be transmitted and transmitting the resultant carrier and upper and lower sets of side bands, receiving the transmitted energy, producing from the received energy a current representative of the carrier and upper set of side bands and a current representative of the carrier and lower set of side bands, separately detecting the two produced currents, additively combining the resulting detected currents to derive one set of signals therefrom, and subtractively combining the resulting detected currents to derive the other set of signals therefrom.

10. In a privacy transmission system, modulating a common carrier with masking and message signals, preventing modulation by masking signals in the absence of message signals and automatically permitting said masking modulation in response to said message signals.

11. In a secrecy communication system, generating carrier energy, providing separate masking and message signals, amplitude modulating the carrier with the mask signals, subjecting the same carrier to timing modulation with said message signals and automatically controlling the effectiveness of said amplitude modulation in response to the message signals.

12. In a method of secrecy communication, providing a privacy message and a separate masking signal, generating a carrier, dividing

said message and masking signal into a plurality of spaced modulation bands such that the masking bands are of frequencies above and below the privacy message bands, and modulating said carrier with said spaced modulation bands to provide a resultant modulated carrier wave whose masking side band component frequencies appear in the form of amplitude modulation and whose message side band component frequencies appear in the form of timing modulation.

13. A secrecy method which comprises generating carrier energy, phase modulating the carrier with a privacy message, amplitude modulating the same carrier with false signals located at frequencies different from message frequencies, and frequency modulating said carrier in accordance with energy derived from said privacy message.

14. A method of imparting a high degree of secrecy to true signals desired to be transmitted between two points, which method consists in producing a carrier wave, amplitude modulating the carrier wave in accordance with a masking set of modulation signals, translating the true signals into at least two spaced bands of modulation frequencies whose intensities are inverted relative to the original signals, phase modulating the carrier wave in accordance with the two bands and transmitting the resultant carrier and upper and lower sets of side bands.

15. A method of imparting a high degree of privacy to true signals desired to be transmitted from one point to another, which method consists in producing a high frequency carrier wave, producing a band of audio frequencies representative of a masking set of signals, converting said band into a plurality of spaced groups of masking frequencies, producing another band of audio frequencies representative of the true set of signals desired to be transmitted, converting the last named band of audio frequencies to spaced groups of frequencies, the masking and true signal frequency groups being interleaved, amplitude modulating the carrier wave in accordance with the groups of masking audio frequencies, phase modulating the carrier wave in accordance with the true signal groups of audio frequencies, and transmitting the resultant carrier and upper and lower sets of side bands.

16. A method of imparting a high degree of secrecy to signals transmitted between two points, which method consists in generating a radio carrier wave, producing a band of audio frequencies representative of a masking set of signals, producing another band of audio frequencies representative of the true set of signals desired to be transmitted, frequency inverting the true signal band of audio frequencies, subjecting separate portions of the carrier to predetermined phase shifts, amplitude modulating one carrier wave portion in accordance with the masking band of audio frequencies, and phase modulating the second carrier wave portion in accordance with the inverted band of true signal audio frequencies.

17. A method of signaling which consists in generating a carrier wave, producing a band of audio frequencies representative of a first set of signals, producing another band of audio frequencies representative of a second set of signals, simultaneously frequency inverting and converting said last named band of audio frequencies to another band of frequencies, amplitude modulating the carrier wave in accordance with the first

named band of audio frequencies, phase modulating the carrier wave in accordance with the converted and inverted band of frequencies, and transmitting the resultant carrier and upper and lower sets of side bands.

18. In a privacy telephonic communication system, the method of imparting a high degree of secrecy to signals desired to be transmitted from one point to another, which consists in producing a carrier wave and two sets of signals, one of said sets of signals comprising the true signals, the other comprising masking signals, amplitude modulating the carrier wave by the masking signals; "quasi-phase" modulating the carrier wave by the true signals, automatically permitting the modulation of the carrier by the masking signals in response to the presence of said true signals, and transmitting the resultant modulated carrier wave.

19. A receiving system for multiplex telephonic system of the type wherein a carrier wave is "quasi-phase" modulated by one set of signals and amplitude modulated by another set of signals, comprising a source of local oscillations, means for changing the frequency of incoming modulated carrier to a lower frequency modulated in accordance with both sets of signals, a pair of filter circuits, means for impressing energy of said lower frequency upon both said circuits, one of said filter circuits being adapted to pass at least frequencies above said lower frequency and the other thereof at least frequencies below said lower frequency whereby one of said circuits passes substantially the upper side bands of said signal modulations and the other the lower side bands thereof, a pair of detectors having separate input circuits, one of said input circuits being

coupled to the output of one of said filter circuits, the other of said input circuits being coupled to the output of the other filter circuit, output circuits for each of said detectors including a common output circuit, a signal-utilizing circuit coupled to said common output circuit for deriving one of said signals, and a utilizing circuit coupled to both said detector output circuits for deriving the other signals.

20. A method of multiplex telephony which consists in producing a carrier wave, amplitude modulating the carrier wave in accordance with one set of signals desired to be transmitted, phase modulating the carrier wave in accordance with another set of signals desired to be transmitted, transmitting the resultant carrier and upper and lower sets of side bands, preventing modulation by said one set of signals in the absence of the other set of signals, permitting modulation by the one set of signals in response to presence of the other set of signals, and providing a degree of frequency modulation of said carrier wave in response to said other set of signals.

21. In a method of secrecy communication, providing a privacy message and a separate masking signal, generating a carrier, separately dividing said message and masking signal into a plurality of spaced modulation frequency bands such that the masking bands are of frequencies above and below the privacy message bands, and modulating said carrier with said modulation bands to provide a resultant modulated wave wherein the masking bands appear as amplitude modulation and the message bands appear as phase modulation.

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