

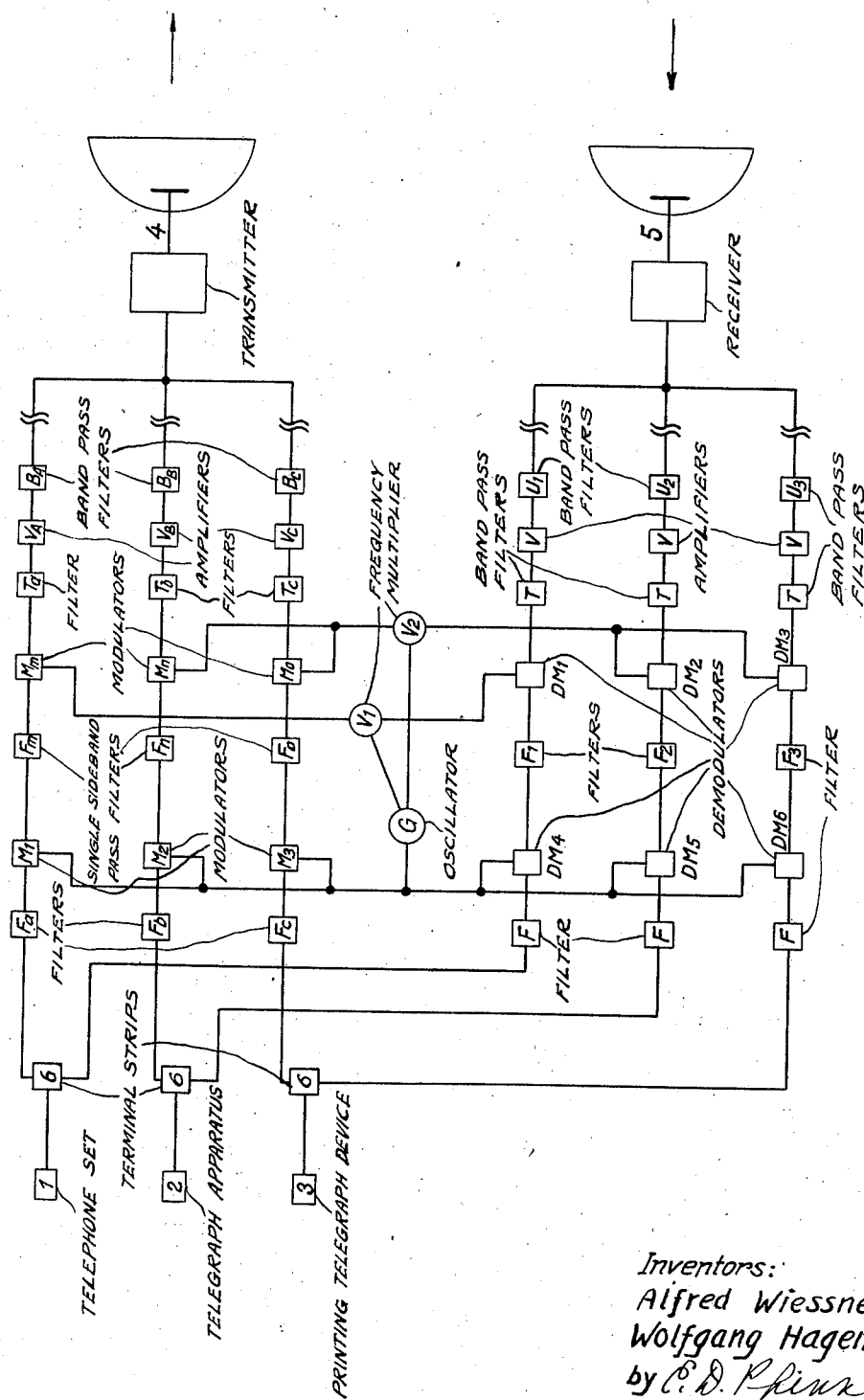
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ARRANGEMENT FOR THE TRANSMISSION OF INTELLIGENCE

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ARRANGEMENT FOR THE TRANSMISSION
OF INTELLIGENCE

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1 Claim. (Cl. 250—9)

This invention relates to carrier frequency communication systems, and more specifically to systems in which signals of different kind are radiated over relaying stations as directed ultra-short waves.

It belongs to common technical knowledge to transmit messages of different kind from one terminal station to another over intermediate relaying stations and to effect such transmission by directed ultra-short waves which are modulated with a plurality of different intermediate frequencies, each in turn being modulated with various message currents, such as telephonic audio frequency currents, telegraph signals and the like. It has heretofore been customary in connection with telegraph signal transmission to employ modulation circuits which completely suppress the carrier, and to transmit only one of the sidebands resulting from such modulation, and to provide means at the receiving station for supplying the missing carrier to complete the modulating carrier.

It is an object of this invention to provide, in systems of the above mentioned type, means which allow the entire number of intermediate modulation frequencies required in the transmission and the receiving equipment to be derived directly or by frequency multiplication from one single oscillator, the frequency of which may be exactly adjusted to any predetermined value. When the outgoing and the incoming traffic employs different ultra-short waves, the several required intermediate frequencies may be so chosen that they are harmonics of the same fundamental frequency, which frequency may be generated by a single oscillator.

Our invention will be more readily understood from the following description, taken in conjunction with the accompanying drawing, the single figure of which diagrammatically shows the transmitting and receiving equipment of one terminal station of a two-way transmission system.

The system embodied in this figure is adapted to transmit three different kinds of messages which, for example, may be impressed upon the transmitting equipment from a telephone set 1, a telegraph apparatus 2 and a printing telegraph device 3. After modulation, these different message currents are radiated from a transmitter 4 as a directed ultra-short wave beam which is picked up by the receiver of the succeeding relay station (not shown). Incoming ultra-short wave signals are picked up by a receiver 5 and then applied to electric filters and demodulating

means preferably disposed in the same rack as the circuit elements of the transmitting equipment.

The operation of the system embodied in the drawing may be as follows. Audio frequency message currents originated in a telephone set 1 are conveyed over a two-wire line, a terminal strip 6 and a filter Fa to a modulator M1 to modulate a carrier frequency, assumed for illustrative purposes to be 8 kilocycles, generated by an oscillator G. In the modulation stage one of the well known push-pull circuits may be used in which the suppression of the carrier takes place. The lower of the two sidebands produced in this modulation stage will, for instance, in transmitting a frequency band width of 300 to 3,000 cycles, be a band comprising 5 to 7.7 kilocycles, passing through a filter Fm of a second modulating stage, in which it is again modulated with a carrier frequency of 24 kilocycles, which is obtained by multiplication in the apparatus V1 of the fundamental frequency of 8 kilocycles. This modulation stage likewise suppresses only the carrier. The lower sideband, 16.3 to 19 kilocycles, remaining from these two modulation stages will pass through a low-pass filter Ta, an amplifier Va and a band-pass filter BA to the transmitter 4. In a similar manner currents from the frequency band produced by the telegraphic apparatus 2 or 3, are impressed upon the transmitter 4 over filter, modulation and amplifier stages Fb, M2, Fn, Mn, Tb, Vb, Bb and Fc, M3, Fo, Mo, Tc, Vc, Bc, respectively. In the two other channels the same carrier frequency, which originates in the fundamental oscillator G, is used in the first modulation stage. In the second modulation stage, however, a carrier frequency of 32 kilocycles, derived from the fundamental in apparatus V2, is employed, and the lower and opposite band passes through the filter Tb and Tc, respectively to transmitter 4. It follows that the frequency ranges in the different channels of transmission are 16.3 to 19 kilocycles, 24.3 to 27 kilocycles, and 37 to 39.7 kilocycles.

At the same station, the receiver which picks up the reverse traffic signals, preferably of another decimeter magnitude wavelength, although employing the same intermediate frequencies, demodulation of intelligence takes place in a similar way in which the different carrier channels are separated by filters and are then applied to demodulators, which, for instance, may consist of any conventional bridge circuits and rectifiers. The intermediate frequency sidebands are separated in the filters U1, U2, and U3,

whereupon these side-bands are subjected to the first stage of amplification in the individual amplifiers V. The higher carrier frequencies are added in the first demodulation stages, DM1, DM2, DM3, and these frequencies which correspond to those of the transmitting equipment are applied to the first demodulation stages so that the corresponding sidebands may be derived from the output circuits of filters F1, F2, and F3, respectively, and be impressed upon the second demodulation stages DM4, DM5, DM6, respectively. As an example, messages incoming to the receiver may therefore be derived from the secondaries of these demodulation stages, be maintained separated one from another by the filters F and be applied to their respective apparatus over the terminal strip 6 so that each of the sets 1, 2, 3 may accomplish two-way communication.

Two-stage modulation is employed because the two sidebands may be more easily separated by suitable low- and high-pass filters in a low modulating stage than in a higher frequency stage, which necessarily involves more complicated and more expensive equipments.

All carrier frequencies, not only of the transmitting equipment but also of the receiving equipment, are harmonics of a single fundamental frequency so that they may be fed from one oscillator G which must be exactly stabilized.

The use of the same generator for transmitting as well as for the receiving equipment, involves the further advantage that the receiving equipment with poor reception and lack of synchronism of generators at different stations necessarily effects equalization of its own generator to the conditions prevailing so that the frequency thereof is likewise stabilized for the outgoing traffic.

What is claimed is:

A two-way carrier frequency station in which a plurality of different signal messages are transmitted and received by use of doubly modulated carrier channels, the signal messages being transmitted on different respective frequencies as single sidebands, the transmitting branch comprising a single carrier wave generator, a plurality of first modulators, means for applying to each of said first modulators carrier waves from said single generator and signal waves constituting one of said plurality of different signal messages, means for selecting a single sideband from the output of each of said first modulators, means for deriving higher frequencies from said carrier wave generator, a plurality of second modulators, means for applying to each of said second modulators one of said derived higher frequencies and modulated energy comprising a single sideband selected from the output of a different first modulator, means for selecting a single sideband from the output of each of said second modulators, and a common transmitter for transmitting said selected single sidebands, and the receiving branch comprising a common receiver for receiving a plurality of single sideband waves, means for segregating said received single sideband waves, first demodulators for said received sidebands, means for applying said derived higher frequencies to said first demodulators, second demodulators and means for applying energy from said single generator and from said first demodulators to said second demodulators to derive the received signal messages therefrom, the modulated energy applied to said second modulators and the modulated energy applied to said second demodulators occupying the same frequency bands.

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