

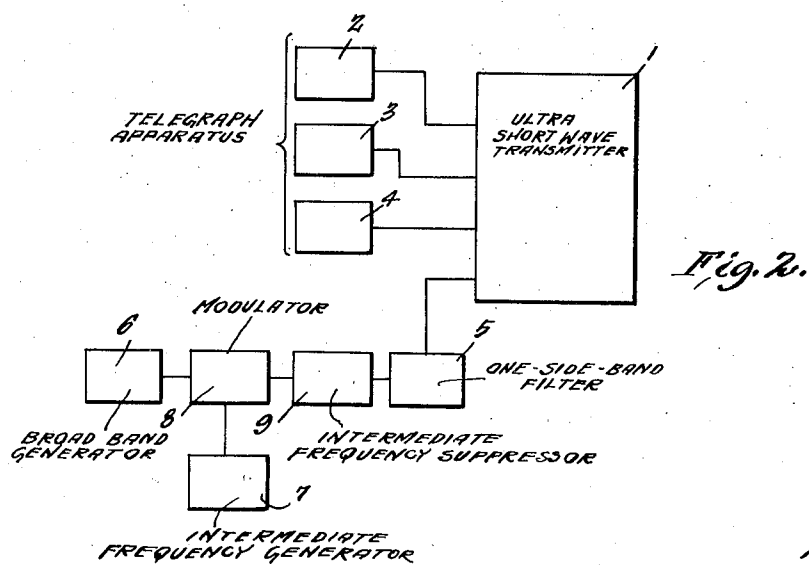
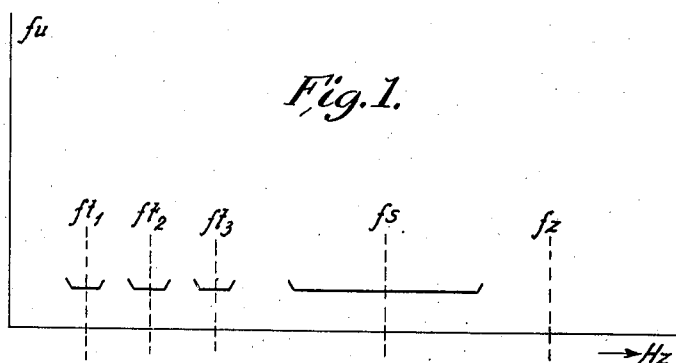
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RADIO TRANSMISSION ARRANGEMENT

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## UNITED STATES PATENT OFFICE

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## RADIO TRANSMISSION ARRANGEMENT

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## 2 Claims. (Cl. 250—9)

The present invention relates to communication systems especially adapted for transmitting a plurality of different messages at ultra high frequencies.

It is well known in connection with transmission over long distances at ultra high frequencies to provide relay repeater stations which are adapted to receive messages from one station and to repeat these to a further station. Such known systems employ different communication channels in such a manner that either each carrier frequency is modulated with one message frequency, or that one single carrier frequency is modulated with several message frequencies by the agency of intermediate carrier frequencies. The invention deals with the last mentioned arrangements, although not limited to systems employing relay repeater stations, but is applicable to all arrangements operating without such stations for interconnecting any two devices.

The invention has for its object to secure reliable operation of this type of systems by using possibly simple means. The average frequency range utilized in interconnections of the aforesaid type involves certain difficulties, which can be removed merely by long wave operation. However, the inventive idea proposes a quite different solution for obviating occurring difficulties.

According to the present invention, the ultra-high carrier frequency is directly modulated with narrow-band message frequencies, e. g. telegraph signals, while being indirectly modulated with wide-band message frequencies, particularly the speech frequency band, by the agency of an intermediate carrier frequency which is subsequently suppressed. Preferably only one side band, viz. the lower side band of the speech frequency is transmitted. This side band is located beyond the telegraph frequencies in the frequency spectrum.

This new arrangement involves following advantages over the above mentioned known systems, which employ one separate carrier for the modulation of each of the different communication channels. It would be desirable to suppress the intermediate carrier in order to reduce the width of the frequency band and to modulate the ultra-high carrier frequency with one of the side bands obtained due to the intermediate frequency modulation, however, the suppression of the intermediate frequency carrier involves considerable difficulties in cases that tone-frequency telegraph channels are concerned, because there are no reliable means available for such suppression within this frequency range. On the other hand,

it must be borne in mind that the expenditure must be kept as low as possible on account of the fact that rather the simplicity of the design with respect to the individual stations emphasizes the superiority of the ultra short wave operation. According to the invention, therefore, the carrier is directly modulated with the telegraph signals, while the messages which demand wider frequency bands are adapted to modulate an intermediate carrier frequency which is suppressed in any known manner, for instance, in a bridge circuit comprising dry rectifiers in which the modulation is effected. The ultra-high carrier frequency is then modulated with one side band only, preferably the lower. The provision of an intermediate carrier at the receiving side is then necessary in order to modulate the ultra high frequency carrier. Difficulties involved with respect to the telegraph channels are not set up in this case, since the adding of the carrier in cases that speech frequency band is concerned, for example, does not require such an accuracy. In other words, some allowance is permissible without introducing troubles to the transmission.

The attached drawing in which, Fig. 1 diagrammatically illustrates the modulation frequency band arrangement, and Fig. 2 illustrates a circuit arrangement in block diagram, schematically demonstrates the position of the different frequencies within the frequency spectrum. The ultra high carrier frequency is designated *fu* generated in transmitter 1, while *ft* 1, *ft* 2 and *ft* 3 indicate three telegraph channels from telegraph apparatus 2, 3 and 4, and *fs* the speech channel output from filter 5, the lower side band of which is transmitted only. The not transmitted intermediate carrier frequency of the speech channel is labelled *fz*. The broad band or speech signals *fs* are generated at 6, and are used to modulate the carrier frequency *fz* produced in generator 7, in modulator 8. The modulated intermediate carrier is then passed through suppressor 9 which suppresses the carrier frequency and a single side band is impressed on transmitter 1 through the single side band filter 5.

What is claimed is:

1. An arrangement for simultaneously transmitting a plurality of messages at ultra high frequencies, comprising means for generating an ultra high carrier frequency, means for producing a plurality of closely adjacent narrow frequency band message wave trains for transmitting separate messages, said narrow frequency bands all being below a given frequency, means

for directly modulating said ultra high carrier frequency with said narrow frequency bands, means for generating an intermediate frequency, the frequency of said intermediate carrier being  
5 higher than said given frequency, means for producing a wide frequency band message wave train, means for modulating said intermediate carrier with said wide frequency band, means for suppressing said intermediate carrier fre-

quency, and means for modulating said ultra high carrier frequency with the side band frequency of said modulated intermediate carrier.

2. An arrangement according to claim 1 further comprising means for suppressing one of the  
5 side bands of said wide frequency band wave train whereby only one side band is used to modulate said ultra high carrier frequency.

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