July 11, 1933. A. MEISSNER 1,917,312

COMMUNICATION ON SHORT WAVES

Filed July 11, 1928

Fig. 1

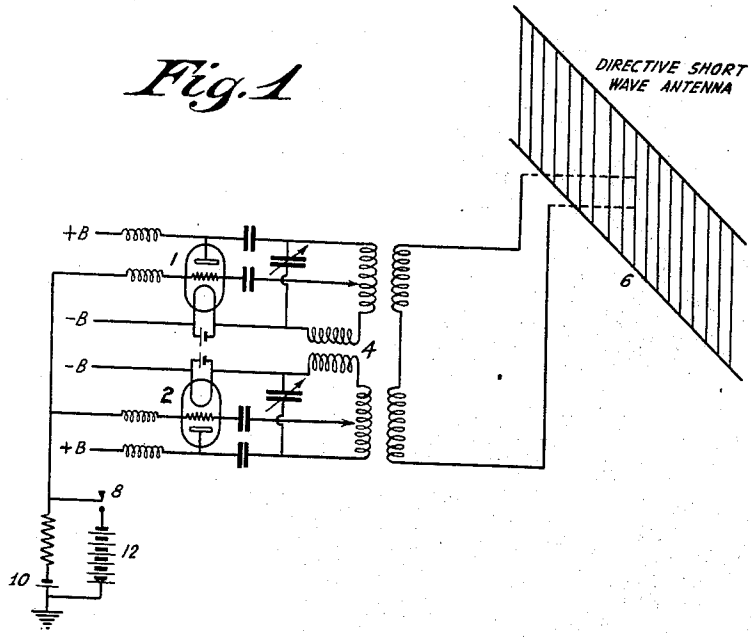
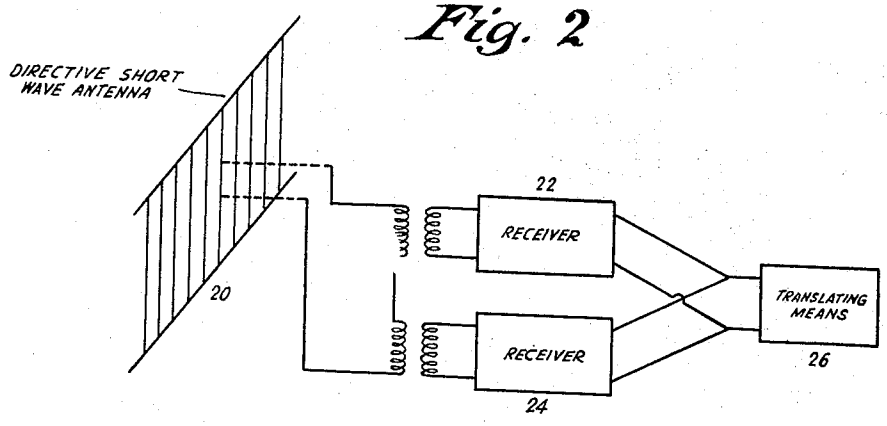


Fig. 2



INVENTOR
ALEXANDER MEISSNER
BY Fred J. Adams
ATTORNEY

Patented July 11, 1933 1,917,312

UNITED STATES PATENT OFFICE

ALEXANDER MEISSNER, OF BERLIN, GERMANY, ASSIGNOR TO TELEFUNKEN GESELLSCHAFT FÜR DRAHTLOSE TELEGRAPHIE M. B. H., OF BERLIN, GERMANY, A CORPORATION OF GERMANY

COMMUNICATION ON SHORT WAVES

Application filed July 11, 1928, Serial No. 291,738, and in Germany July 28, 1927.

This invention relates to communication on short waves, and more particularly to a method for diminishing fading without unduly increasing the expense of the station equipment.

When using short waves it has been found that communication in an intelligible manner is greatly hampered by the presence of fading phenomena. It has further been found that the fading is not simultaneously present in different simultaneously transmitted waves. It is desirable for this reason to transmit simultaneously on two different wavelengths. In practice, however, this scheme would mean such a substantial increase in the cost of equipment that such duplicate transmission method has heretofore not been used.

The present invention represents a very considerable saving in cost. In the transmitter plants nowadays operated mostly on the beam system, the antenna plant is the most costly part of the station. In accordance with the present invention, the antenna is so built and the waves of the two transmitters are so chosen that two waves can be sent out simultaneously with one and the same antenna system. Experimental work shows that only a very slight difference in wave-length is needed to diminish the fading phenomena at the receiver station. By the convenient and skilful disposition of the transmitters and the antenna, it is feasible, with a slight difference in the wave-lengths, to bring both transmitters simultaneously to act upon one and the same directive antenna. Mutual influences between the two transmitters which, of course, are bound to arise, may then be eliminated by neutralization means between the transmitters.

Looked at from an economical viewpoint, this novel arrangement is of particularly great value also for the reason that the operation is free from extra energy losses. While heretofore it has been necessary to provide a powerful transmitter adapted to send out a single wave and feed it to the antenna, the energy of the transmitter here disclosed is halved, and half the total energy may be put into each wave.

At the receiving end an antenna system similar to that at the sending end may be employed, and in a similar manner two receivers may be coupled with one and the same antenna, the same energy being brought to act by the addition or integration of the two transmitting energies in the two receiver systems, just as when working with one sender and one antenna.

The method is particularly valuable when the chief point is to advantageously utilize elaborate directive space radiation antennæ.

The invention is described in connection with the accompanying drawing, in which

Figure 1 is a transmitter, and

Figure 2 is a receiver, in accordance with my invention, represented in simple form.

Referring to Figure 1 there are two transmitters, 1 and 2, here indicated by way of example as each comprising an electron emission tube coupled to an oscillation circuit in three point connection. The oscillation circuits comprise not only the regenerative coupling coil and the tuning condensers, as is customary, but also include the coupling coils 4, which are coupled in such a direction as to oppose the coupling between the transmitters which would otherwise exist by reason of their both being coupled to a single directive short wave antenna 6. The tube anodes and control electrodes are provided with suitable blocking condensers and choke coils to separate the high frequency and direct currents. Both transmitters are keyed by a single key 8, which serves to vary the bias on the control electrodes of the tubes by applying thereto the potential of either the battery 10, or the battery 12. It will be understood, of course, that in more elaborate form the transmitters may comprise frequency controlling oscillators which govern the frequency of power amplifiers, in which case the keying may be accomplished at any amplifier stage in the transmitters, as well as at the oscillator itself.

A receiver is indicated in simple form in Figure 2, and comprises a directive short wave receiving antenna 20, the energy collected from which is supplied to receivers 22 and 24, tuned respectively to the frequencies

of the transmitters 1 and 2 in Figure 1. These receivers may include successive heterodyne stages, if these prove desirable. The signalling energies from the receivers, before translation, are combined and fed to a single translating means 26.

I claim:

1. The method of communicating with short wave energy which includes generating transmission energy at one high frequency, separately generating transmission energy at another slightly different high frequency, modulating both of said energies simultaneously in accordance with a signal being transmitted, directively radiating both of the modulated energies from a single radiating point, and opposing said energies at the generation point to prevent the generation of energy of a single frequency.

2. The method of communicating telegraphically with short wave energy which includes generating transmission energies of slightly different high frequencies, simultaneously modulating said energies in accordance with a telegraphic signal, opposing said energies sufficiently to prevent them from oscillating in synchronism, directively radiating the modulated energies at a single point, directively collecting the radiated energy at a single receiving point, separating the received frequencies, transforming the received high frequency energies into translation energies, combining the translation energies, and translating the combined energy.

3. A transmission system comprising a first high frequency transmitter, a second high frequency transmitter tuned to a slightly different high frequency, means for simultaneously modulating both of the transmission energies in accordance with a signal, a directive antenna for radiating both of the modulated energies, means coupling the transmitters to the antenna, and means coupling the transmitters in opposition to prevent them from oscillating in synchronism.

4. A short wave telegraph communication system comprising a transmission station having a plurality of transmitters each tuned to slightly different high frequencies, a single modulating means for simultaneously modulating each of said transmitters in accordance with a telegraphic signal, a directive antenna, means coupling the transmitters to the antenna, means coupling the transmitters to each other in opposition to oppose the mutual coupling caused by the antenna coupling, and a receiving station having a directive receiving antenna, a plurality of receivers tuned to the transmission frequencies, means coupling the receivers to the receiving antenna, a single translating device, and means coupling the translating device to the receivers.

ALEXANDER MEISSNER.