June 6, 1939. H. SCHARLAU ET AL 2,160,913

RELAYING

Filed Aug. 14, 1936

Fig. 1

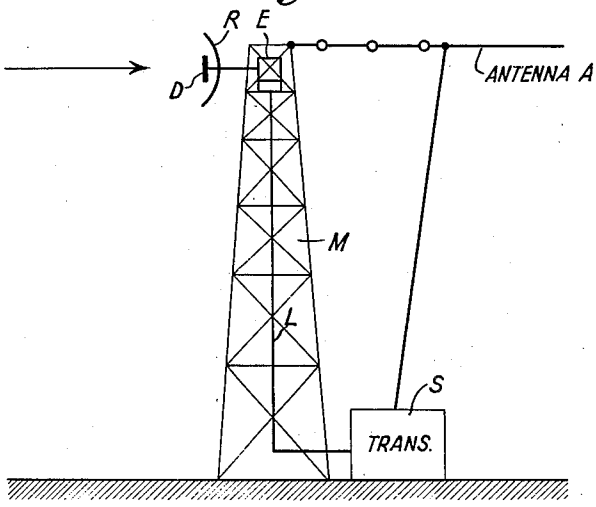


Fig. 2

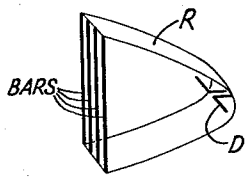
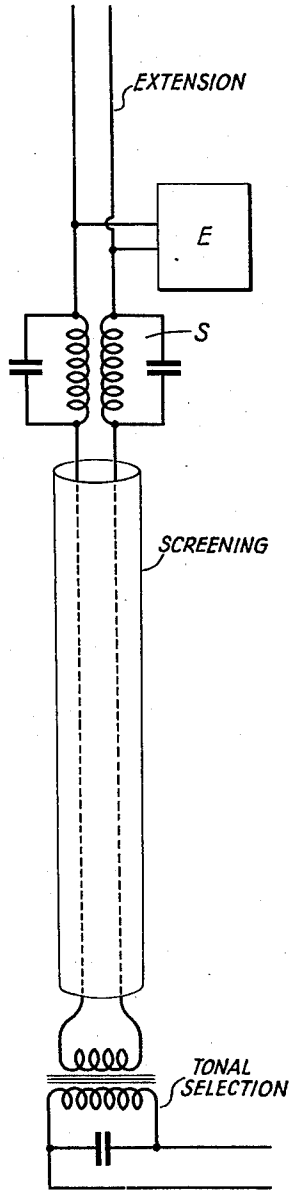


Fig. 3



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2,160,913

RELAYING

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4 Claims. (Cl. 250—15)

It is known that larger transmitters are ordinarily located outside the cities in order to obtain favorable propagation, mainly because the question of available space makes this necessary. Such transmitters must be keyed from a remote place in order that the messages need not be physically carried to the transmitter. The placing of a special cable often causes difficulties, so that suggestions have already been made to use ultra-short waves for carrying out the remote keying, since such short waves have the property of being adapted for concentration, thus preventing the keying from being readily disturbed by other transmitters.

The receiver for the ultra-short waves has already been mounted at the bottom of the antenna mast of the transmitter to be keyed. In order to afford bridging of larger distances, it would, however, be desirable to fasten the receiver to the top of the mast, since in view of the linear propagation of ultra-short waves, the transmitter and receiver, as is known, should be mounted as high as possible. Hitherto, such requirement for a transmitter to be keyed did not present itself, but in the future, it will be necessary also to bridge larger distances between the city and the transmitter to be keyed.

Hitherto, in stations with remote keying, it was not considered possible to mount the ultra-short wave receiver at a greater height, since the antenna of the transmitter to be keyed in view of the small distance to the ultra-short wave receiver reacts upon the latter, whereby beats in the keying and sticking of the keying relay occur, so that the desired keying signals cannot be sent out at all, or only with distortion.

In accordance with the invention, the ultra-short wave receiver, despite this difficulty, is mounted at the top of the mast of the transmitter to be keyed, and at the same time a reaction of the transmitter antenna upon the ultra-short wave receiver is prevented through shielding and decoupling means known for other purposes.

Reference will now be had to the drawing:

Fig. 1 represents a complete station.

Fig. 2 shows a short wave receiving antenna arrangement, and

Fig. 3 illustrates a mode of coupling the receiver of the station to the transmitter.

The station to which the invention is to be applied will now be explained by reference to Fig. 1 of the drawing. In the figure, the transmitter antenna of the transmitter to be keyed is designated by A, and the associated transmitter is S. The antenna is suspended from the mast M. The mast has mounted thereon an ultra-short wave receiver E with dipole D and reflector R receiving the keying signals and transmitting them to the transmitter S across line L. In the transmitter S the high frequency applied to the antenna A is keyed from line L. Present day transmitters are operated with considerable energies, so that rather high voltages appear at the antenna and also strong voltage pulses owing to the keying. These pulses have an inductive effect upon the ultra-short wave receiver, and the oscillatory circuits, although they may be tuned to other frequencies, are excited to produce damped oscillations. But also at the vacuum tube proper, high frequency voltages having the wave of the transmitter, may be produced, since as already stated the voltages at the antenna A are very high. It is also across the line L that the voltages may enter the receiver E where they are detected, or they enter directly the keying arrangement of the transmitter S and may at this place be unintentionally detected in an amplifier. The detected currents obviously correspond to the keying signals, thus obtaining a real feed back which may produce a natural oscillation of the entire station, thus preventing the proper sending out of the signals. Since, as learned from experiences with receivers mounted in the vicinity of powerful transmitters, such disturbances are to be expected, it was, as already stated, hitherto considered an impossibility to mount the ultra-short wave receiver at the top of the mast of the transmitter to be keyed. The means for preventing feed back, as known for other purposes and utilized herein for practicing the invention, will be briefly described in the following.

In the first place, it will be advisable to choose a suspension length for the antenna A that is as long as possible so as to decrease the influence between antenna A and receiver E. Furthermore, it is important to shield the line L as shown in Fig. 3. The receiver is to be shielded primarily at the rear and at the sides, and also the front is to be shielded by the provision of a rod grid as shown in Fig. 2. The rods must be disposed at right angle to the electrical polarization plane of the arriving ultra-short waves. Protection against the field of the longer waves transmitted by the antenna A can further be obtained by mounting the receiver inside the top of the mast, in which case the parts of the mast act as short circuit members for the longer waves.

Line L is suitably choked and, if necessary, filter means S (Fig. 3) are inserted for the longer waves ahead of the vacuum tube of receiver E.

A further possibility in decoupling resides in continuing the lead-in connections beyond the receiver, as shown in Fig. 3, so that the receiver will be situated at a point on the line which is substantially a nodal position with respect to the energy in the antenna, at which, owing to the voltage and current course, only a small amount of energy enters the receiver.

Through the use of a tone selection arrangement, the range in which feed back may occur can be still further greatly reduced. This tone selection arrangement is, in effect, a filter which suppresses certain frequencies at which "singing" might otherwise occur.

What is claimed is:

1. A relaying system comprising an ultra-short wave receiving antenna adapted to receive signals to be relayed, a reflector in the rear of said antenna, said reflector having a polarizing grid arranged at right angles to the polarization plane of the incoming signal waves, and a receiver therefor, a tall mast for supporting said short wave antenna, reflector and receiver at the top thereof, a transmitter at the bottom of said mast adapted to respond to said received signals, a connection from said short wave receiver to said transmitter, means for shielding said connection and receiver, a transmitting antenna adapted to be energized by said transmitter, said last antenna also being supported from said mast, and an energy feeder extending from said transmitter to said transmitting antenna.

2. A remote keying system comprising an ultra-short wave receiving antenna adapted to receive the keying signals, a reflector in the rear of said antenna, said reflector having a polarizing grid arranged at right angles to the polarization plane of the incoming signal waves, and a receiver therefor, a tall metallic lattice work mast for supporting at the top thereof said short wave antenna, said reflector and said receiver, said receiver being located within said mast, a transmitter at the bottom of said mast adapted to be keyed by said received signals, a connection from said short wave receiver to said transmitter to be keyed, means for shielding said connection and receiver, a transmitting antenna adapted to be energized by said transmitter to be keyed, said last antenna also being supported from said mast, and an energy feeder extending from said transmitter to said transmitting antenna.

3. A remote keying system comprising an ultra-short wave receiving antenna adapted to receive the keying signals, a reflector in the rear of said antenna, said reflector having a polarizing grid arranged at right angles to the polarization plane of the incoming signal waves, and a receiver therefor, a tall mast for supporting at the top thereof said short wave antenna, said reflector and said receiver, a transmitter at the bottom of said mast adapted to be keyed by said received signals, a connection from said short wave receiver to said transmitter to be keyed, a filter in said connection, means for shielding said connection and receiver, a transmitting antenna adapted to be energized by said transmitter to be keyed, said last antenna also being supported from said mast, and an energy feeder extending from said transmitter to said transmitting antenna.

4. A remote keying system comprising an ultra-short wave receiving antenna adapted to receive the keying signals, a receiver therefor, a reflector in the rear of said antenna, said reflector having a polarizing grid arranged at right angles to the polarization plane of the incoming signal waves, a mast for supporting at the top thereof said short wave antenna, said reflector and said receiver; a transmitter at the bottom of said mast adapted to be keyed by said received signals, a two-wire connection extending from said receiver to said transmitter, a filter in each wire of said connection for filtering waves longer than said received short waves, a shield surrounding said two wire connection, a substantially horizontal wire transmitting antenna adapted to be energized by said transmitter, said last antenna also being supported at the top of said antenna, and an energy feeder extending from said transmitter to said transmitting antenna.

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