G. MARCONI
WIRELESS SIGNALING SYSTEM.
APPLICATION FILED AUG. 9, 1906.

924,560.

Patented June 8, 1909.
To all whom it may concern:

Be it known that I, GUGLIELMO MARCONI, a subject of the King of Italy, residing in London, England, have invented certain new and useful Improvements in Wireless Signaling Systems, of which the following is a specification.

The object of this invention is to provide improved means for communicating electrical signals without wires and by means of Hertz waves or electrical oscillations of high frequency, by furnishing improved means for giving direction to the emitted waves at a transmitting station; and also furnishing improved means for receiving waves from a specified direction.

The present application is a division of my application Serial No. 289,327, filed November 27, 1905, and it is intended to include certain portions of the subject-matter disclosed in that application.

Referring to the accompanying drawings, Figure 1 is a diagrammatic illustration of an improved receiving conductor constructed in accordance with my invention, and used at a receiving station, and Fig. 2 is a diagrammatic illustration of a modified form of my improved conductor at a receiving station and also at a transmitting station.

In Fig. 1, A' A' denote a conductor of electricity supported in substantial parallelism with the surface of the earth and divided at the middle. Between the two juxtaposed ends of the conductor A' A' is connected a detecting device M, which may be of any form, but which is preferably a magnetic detector of the type which is now well known in the art. The divided conductor and the detecting device are entirely insulated from the earth. At the right-hand of the figure is shown diagrammatically a transmitting station located at a distance and comprising an elevated conductor A of the type commonly used in wireless signaling systems, provided with a spark-gap B in the secondary circuit S of a transformer; the primary of the transformer having in circuit therewith a generator of alternating currents and a circuit-closing key. This portion of the figure is intended merely as a diagrammatic representation of a well known type of transmitting apparatus, but the character of the transmitting apparatus used does not affect my present invention, which, so far as this figure is concerned, is illustrated only at the receiving station at the left-hand of the figure.

Though I have shown in this figure a transmitting station equipped with the well known elevated conductor, it is preferable to use at the transmitting station, as well as at the receiving station, my improved form of conductor, divided into two parts and insulated from the earth, and having the spark-gap or generating circuit located between the juxtaposed ends of the divided conductor.

In Fig. 2 I have illustrated a modified form of my improved antenna, in which, instead of using a single conductor, I may use a number of conductors arranged parallel to one another in a horizontal plane. The left-hand side of this figure represents a transmitting station in which the transmitting conductor is composed of three parallel conducting rods or wires A, A, A, divided at the middle and connected to the secondary coil T of an oscillation transformer. The primary T' of this transformer is connected in a closed circuit with a spark-gap C, capacity N, and the secondary of a transformer D. The primary of this transformer is in circuit with a generator of alternating currents H and a circuit-closing key K. This arrangement of oscillation transformer and related circuits is one which is now well known and commonly used in the art and is illustrated here merely as a typical form, since the oscillation transformer and related circuits form no part of my present invention. On the right-hand of the figure is shown a receiving station provided with an insulated conductor A' A' A', having a magnetic detector or other indicating device M connected between its ends.

I have found that if an antenna of the character described is used at a transmitting station, then the Hertz waves or etheric disturbances are practically confined to a straight path which is a prolongation of the line of the antenna in both directions, and that a receiver at a distance will be operated only if it is substantially within this straight path. The nearer to the ground that the antenna is disposed, the more confined the path of the radiations, but the antenna may be supported above the ground at a distance small compared to its horizontal length, in which case the radiations are somewhat more
powerful but are not so restricted in direction, and the more the antenna is raised, the more the radiations tend to spread out.

In all cases the antenna and the oscillation generating or detecting device should be entirely insulated from earth.

When my improved antenna is used at a receiving station with the detector connected between its juxtaposed ends, the detector is operated only by waves emitted from a generating center with respect to which the two-part horizontal receiving antenna is radially disposed, or, where my improved antenna is used at the transmitting station, the length of the two-part horizontal receiving antenna is substantially a continuation of the straight line of the transmitting antenna. I have found that when this two-part horizontal insulated receiving antenna is used, the undesired and disturbing effects of atmospheric waves are eliminated. I have found, furthermore, that the best effects are obtained when the length of the horizontal antenna is that of one-quarter wave-length of the waves which are being used, or a multiple thereof, as illustrated by the dotted line in Fig. 1.

It will be understood that while I have illustrated two specific forms of my improved antenna, the invention is not limited to those two specific forms, nor is the invention in any way connected with the particular form of oscillation generating or conducting devices which are used at the transmitting and receiving stations.

What I claim as my invention and desire to secure by Letters Patent, is:

An antenna for wireless signaling systems comprising a conductor consisting of two parts supported in substantial parallelism with the surface of the earth and suitable electrical instruments or apparatus connected between its parts, the length of said conductor being substantially equal to one-fourth, or its multiple, of a wave length of the oscillations impressed upon it and said conductor being situated in a vertical plane coincident with that passing through a distant station.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

GUGLIELMO MARCONI.

In the presence of:

H. KERSHAW,

H. W. ALLEN.