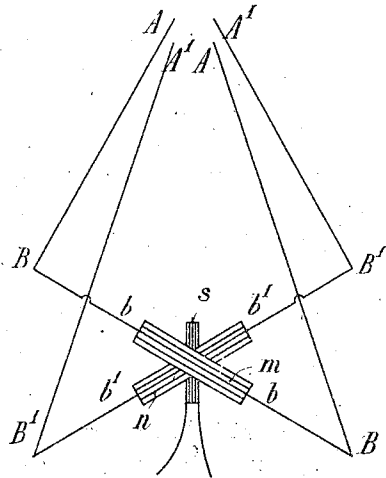


945,440.

Patented Jan. 4, 1910.

FIG 1_



FIG_2_

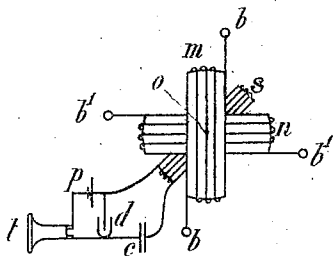
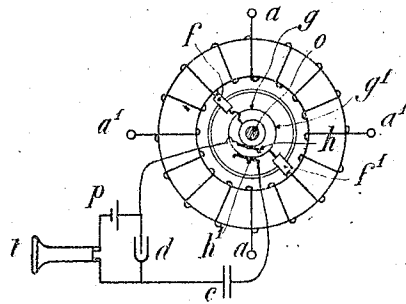


FIG. 3_



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SYSTEM OF DIRECTED RECEPTION FOR WIRELESS-TELEGRAPHY STATIONS.

945,440.

Specification of Letters Patent.

Patented Jan. 4, 1910.

Original application filed October 1, 1907, Serial No. 395,366. Divided and this application filed June 16, 1908. Serial No. 438,775.

To all whom it may concern:

Be it known that we, ETTORE BELLINI and ALESSANDRO TOSI, subjects of Italy, residing at 4 Rue du 29 Juillet, Paris, in the Republic of France, have invented new and useful Improvements in Systems of Directed Reception for Wireless-Telegraphy Stations, of which the following is a specification.

Our invention relates to a system of wireless telegraphy or system employing the energy under the form of electromagnetic waves, which permits a receiving station provided with two or several "dirigible aerials" to communicate in all directions without it being necessary either to turn the dirigible aerials, which is not applicable in practice, or to employ a great number of dirigible aerials, which is very complicated and has besides inconveniences as regards the working. By the term "dirigible aerial" we mean any aerial conductor having the property of radiating or receiving waves with different intensities according to the different directions. A closed oscillation circuit, or a pair of antennae connected together by a conductor constitute respectively a dirigible aerial.

To describe the parts of our invention, we have supposed that it is applied to the case in which the dirigible aerials are closed oscillation circuits, but of course all the parts of the installation are applicable in the same manner, to the other dirigible aerials.

This application is a division of an application filed October 1, 1907, Serial No. 395,366.

In the annexed drawing, Figure 1 represents a diagrammatic perspective partial view of a receiving station according to our invention comprising two dirigible aerials. Figs. 2 and 3 are diagrammatic plan views showing the devices enabling communication to be insured in any direction, without causing the dirigible aerials to turn.

As is well known, a directed wireless telegraphy station must generally be capable of communicating in any given direction. Up to now, it has been necessary for this purpose either to turn the aerial according to the direction of the transmitting station, or to arrange a great number of dirigible aerials in the different directions. According to our invention, it is on the contrary possible to communicate in any given direction with a very small number of dirigible

aerials (two for instance) and without causing the aerials to turn. We employ for this purpose two or more dirigible aerials in a fixed position, which act all at the same time on a detector, but each with an intensity depending on the angle formed by its plane with the direction of the transmitting station. The partial actions of the various dirigible aerials are received by a special receiving apparatus which composes them into a sole resultant, the direction of which depends on that of the transmitting station.

We have shown in the drawing two different arrangements which we may employ to realize the purpose set forth. In both cases, we have supposed that the dirigible aerials were constituted by two closed oscillation circuits of triangular shape $ABB'A$ and $A'B'B'A'$ arranged respectively in two perpendicular planes.

According to the first arrangement (Figs. 1 and 2) we employ in combination with said dirigible aerials an apparatus of the inductive excitation type composed of two fixed coils m and n perpendicular one to each other. Each coil is connected respectively to one of the dirigible aerials through terminals $b\ b$ and $b'\ b'$. A third coil s is placed within the free space between the coils m and n and is capable of rotating about the axis o or intersection of the median planes of the coils m and n . It is connected to the wave detector d which may be of any type: we have shown as example an electrolytic detector. c represents a condenser, p the battery, and t the telephone receiver. When the waves reach the station, the two closed oscillation circuits forming the aerial are influenced at the same time and consequently oscillating currents are produced in the circuits and in the coils m and n . The intensities of said currents depend on the angles formed by the direction of the transmitting station with the planes of said circuits. Each coil produces inwardly a magnetic field proportionate to its current intensity and the two fields compose themselves into a sole resulting field the direction of which is perpendicular to that of the transmitting station. This field acts upon the movable coil s in which an electromotive force maximum will take place when the plane of its winding will be perpendicular to said resulting field, that is to say, when the median plane of the coil will be di-

rected toward the transmitting station. In this position the reception will reach its maximum. Therefore, when the position of the movable coil which gives the maximum reception will be reached, three results will be obtained: *a*.—To receive from the station with which it is desired to communicate. *b*.—Not to receive from other stations eventually at work and which are situated out of the plan which unites the stations in communication and the receiving station. *c*.—To determine the direction of the transmitting station from which the signals are received.

15 In the second arrangement illustrated in Fig. 3 the apparatus employed is of the direct excitation type. It is constituted by a continuous spiral wound on a torus. The points *b b* and *b' b'* of the aerial circuits, instead of being connected to the coils *m* and *n* of the foregoing apparatus, are connected to the points *a a* and *a' a'* of the torus at the ends of two perpendicular diameters. Two brushes *f f'* insulated one from the other and invariably fixed at 180° may rotate in continuous contact with the torus, about the axis *o* by means of rings *g g'* and contact pieces *h h'*. The brushes are connected to the wave detector which may be of any kind and which in the drawing is shown diagrammatically as being of the same kind as that of the Fig. 2. The circuit of the detector *d* is in this case excited directly by two aerials circuits. The direct excitation, as is known, is at the same time a magnetic and galvanic excitation, the magnetic excitation being far superior to the galvanic. The winding of the torus works like an "autotransformer". By causing the position of the brushes *f f'* to be varied, the degrees of connection between the circuit of the detector and each aerial circuit are varied. When the brushes *f f'* are arranged

according to *a a*, the degree of connection is maximum for the aerial connected to the points *a a* and null for the other. A reverse analogous action takes place when the brushes are arranged according to *a' a'*. When a transmitting station is in the direction *a a* or *a' a'* the maximum effect upon the detector will take place when the brushes will be arranged according to *a a* or according to *a' a'*. When a transmitting station is in intermediate direction between *a a* and *a' a'*, it will be necessary to arrange the brushes in an intermediate position between *a a* and *a' a'* to have the maximum of reception, the position of the brushes having a determined relation with the direction of the transmitting station. Consequently when the position of the diameter of the brushes which gives the maximum reception will be ascertained, the same three results hereinbefore described will be obtained.

Having now described our invention what we claim as new and desire to secure by Letters Patent is:

A system of directed reception for wireless telegraphy stations comprising for the aerial part of the receiving station several dirigible aerials in a fixed position, combined with fixed windings inserted in the conducting part of the aerials, with a wave detector, and with a rotary device connected to the detector and influenced by the currents which traverse the fixed windings, substantially as described and for the purpose set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

ETTORE BELLINI.
ALESSANDRO TOSI

Witnesses:

DEAN B. MASON,
ANTOINE LAVOIX.