No. 744,897. PATENTED NOV. 24, 1903.

F. BRAUN.

MEANS FOR DIRECTING ELECTRIC WAVES FOR USE IN WIRELESS TELEGRAPHY.

APPLICATION FILED FEB. 19, 1902.

NO MODEL.

Fig. 1.

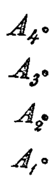


Fig. 2.

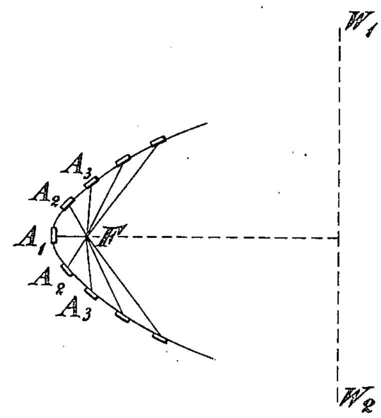


Fig. 3.

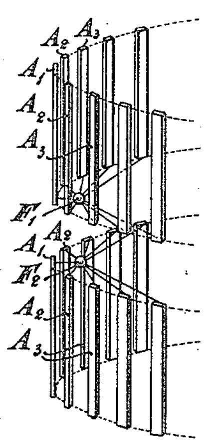
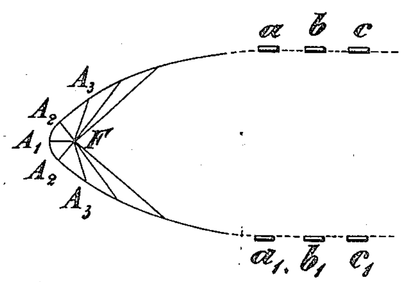


Fig. 4.



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UNITED STATES PATENT OFFICE.

FERDINAND BRAUN, OF STRASSBURG, GERMANY.

MEANS FOR DIRECTING ELECTRIC WAVES FOR USE IN WIRELESS TELEGRAPHY.

SPECIFICATION forming part of Letters Patent No. 744,897, dated November 24, 1903.

Application filed February 19, 1902. Serial No. 94,729. (No model.)

To all whom it may concern:

Be it known that I, FERDINAND BRAUN, a subject of the Emperor of Germany, residing at Strassburg, Germany, (whose post-office address is No. 1 Universitätstrasse, Strassburg, Alsace, German Empire,) have invented new and useful Improvements in Means for Directing Electric Waves to be Used in Wireless Telegraphy, of which the following is a specification.

The present invention relates to reflectors adapted for use in connection with wireless telegraphy for the purpose of imparting to the electric waves a certain direction of propagation.

It consists principally in a metallic grating of parabolic or similar form constructed or arranged in a novel manner, hereinafter more fully described.

The invention is shown in the accompanying drawings, of which—

Figure 1 is a diagrammatic view illustrating the theoretical physical principle. Fig. 2 is a section of the new reflector. Fig. 3 is a perspective view, while Fig. 4 represents an improvement of the reflector by means of deflectors.

It is well known in optics that series of luminous lines located in one plane and parallel to each other at equal distances apart and having the same phase and amplitude of oscillation will produce what is called in optical science a "wave front" which is a plane. These lines are indicated in Fig. 1 by points $A' A^2 A^3 A^4$, which represent sections of the luminous lines making up the wave front normal to the plane of the drawings. The same effect can also be obtained by the arrangement of a parabolic mirror. If, for instance, in Fig. 2 F is the luminous point and $A^3 A^2 A' A^2 A^3$ are parts of a parabolical mirror of cylindrical shape, $W' W^2$ will indicate the wave front which is a plane. This method may be employed for wireless telegraphy in the following manner: A series of parallel rods $A^3 A^2 A' A^2 A^3$ are arranged at equal distances from each other, so as to produce a cylindrical parabolical mirror in the form of a grating. Each rod is connected by a straight wire to a small ball F, set in the focus-line of the mirror. As shown in Fig. 3, two sets of rods are provided for, and between the two balls F F' set in the focus-line a spark is generated from time to time by a Ruhmkorff apparatus or an electrical static machine. (Not shown.) Now it will be evident that as all rods are excited from the same center and as the phase difference of the oscillations of the single rods is determined by the length of the corresponding wires the set of rods act in such manner as to generate a wave front which must be in a plane. The wave motion therefore will be essentially rectilineal. It is obvious that by these means the greatest amount of the radiating energy will be guided in one direction. The phenomenon is physically analogous to the ordinary parabolic mirror and to Hertz's mirror for electric waves. Its peculiarity, however, is that every rod fulfils its own oscillation, provided it is tuned by ordinary means, as capacity and self-induction, to the same periodicity.

The advantage of the new system over the ordinary metallic continuous parabolic mirror is that much more energy is set inaction, as the energy depends on the capacity of the single rods, which may be increased by increasing the capacity of the rods and adding, for instance, condensers to the same. A further advantage may be secured by suitable additional rods *a b c*, Fig. 4, or similar bodies—as, for instance, human bodies. These bodies act to prevent lateral deflection.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. In mirrors for wireless telegraphy the combination of sets of rods tuned to the same frequency arranged parallel to each other in a parabolic cylindrical surface, spark-balls for electric disruptive discharge, and wires connecting the balls and the said rods, substantially as and for the purpose described.

2. In mirrors for wireless telegraphy, the combination of sets of rods tuned to the same frequency arranged parallel to each other in a parabolic cylindrical surface, and spark-balls for electric disruptive discharge, said balls being arranged in the center line of the parabolic cylindrical surface, as set forth.

3. In mirrors for wireless telegraphy, the combination of sets of rods tuned to the same frequency arranged parallel to each other in

a parabolic cylindrical surface, spark-balls for electric disruptive discharge, said balls being arranged in the center line of the parabolic cylindrical surface, wires connecting the balls and said rods, and deflecting rods arranged parallel to the said center line, substantially as and for the purpose described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

FERDINAND BRAUN.

Witnesses:
MATHIAS CANTOR,
MARIA SCHORN.