E. C. HANSON AND E. T. JONES.

RADIOSIGNALING SYSTEM.

APPLICATION FILED FEB. 24, 1920.

1,429,240.

Patented Sept. 19, 1922.

2 SHEETS—SHEET 1.

FIG. 1

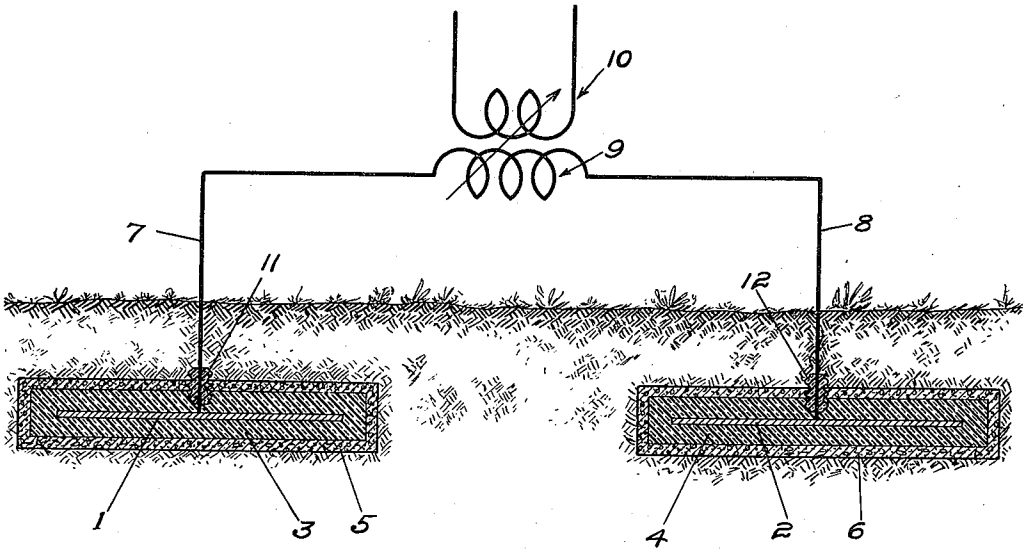
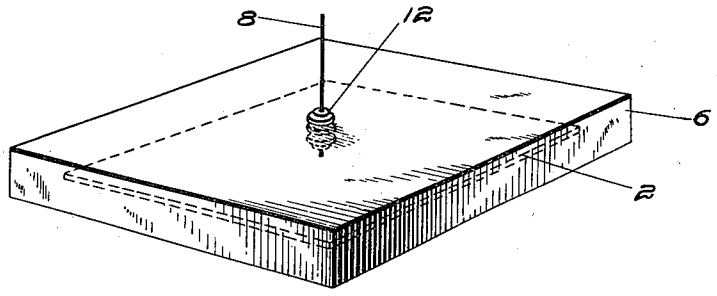


FIG. 2



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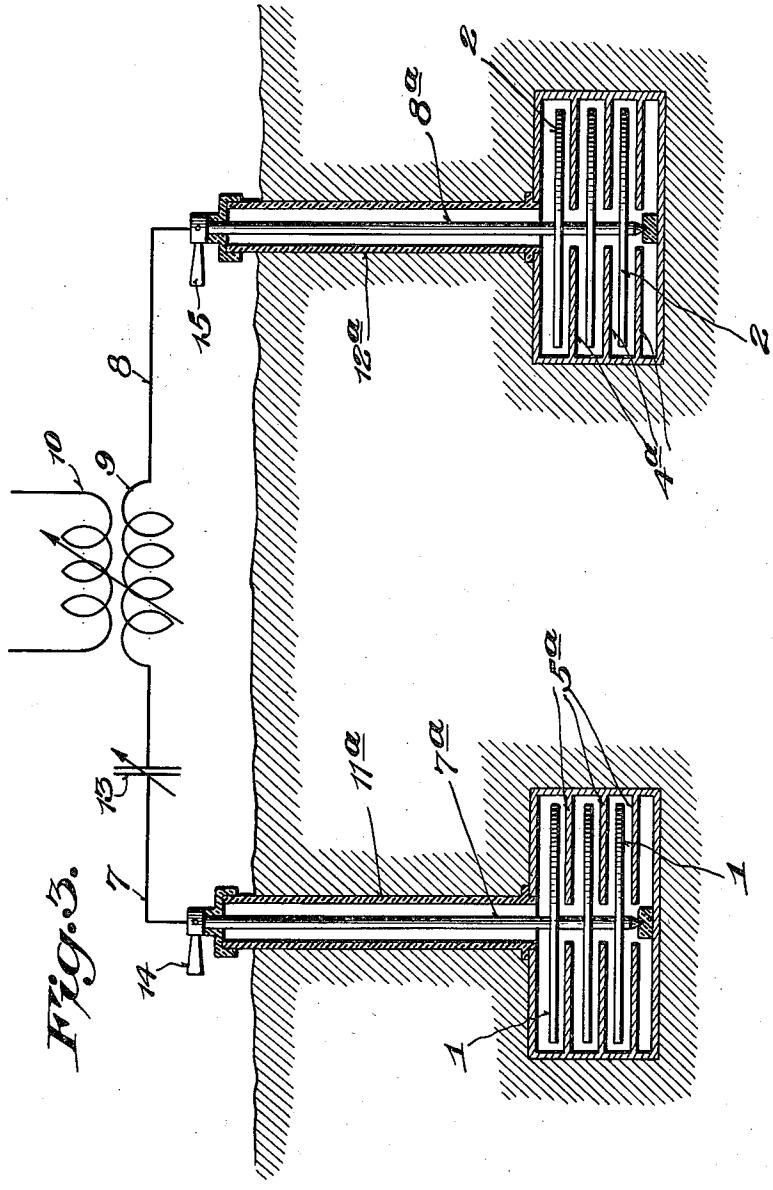


Fig. 3.

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UNITED STATES PATENT OFFICE.

EARL C. HANSON, OF WASHINGTON, DISTRICT OF COLUMBIA, AND EDWARD T. JONES, OF NEW ORLEANS, LOUISIANA.

RADIOSIGNALING SYSTEM.

Application filed February 24, 1920. Serial No. 361,062.

To all whom it may concern:

Be it known that we, EARL C. HANSON, a citizen of the United States, residing at Washington, District of Columbia, and EDWARD T. JONES, a citizen of the United States, residing at New Orleans, in the parish of Orleans and State of Louisiana, have invented certain new and useful Improvements in Radiosignaling Systems, of which the following is a specification.

Our invention relates to underground or subterraneous antenna systems and more particularly to the construction of antennæ of this character.

One object of the invention is to provide an underground antenna system applicable for installation within a limited area. A further object of the invention is to provide means for varying the constants of the antennæ by directly modifying the capacity of the antenna collectors.

Our invention will be more clearly understood by reference to the accompanying drawing, in which—

Figure 1 shows diagrammatically one form of concentrated ground antennæ to be used in carrying out the invention; Figure 2 shows in detail the construction of the antenna plates shown in Figure 1; and Figure 3 shows diagrammatically a modification of the ground antennæ with means for varying the capacity constant of the same.

Referring now more particularly to Figure 1, reference characters 1 and 2 represent metallic antenna plates surrounded by any suitable dielectric encasements 3 and 4 which are enclosed in casings 5 and 6. The casings 5 and 6 may be constructed of metallic or non-metallic material. The insulated antenna leads 7 and 8 pass through insulating bushings 11 and 12 in the top of casings 5 and 6, and are connected electrically to the plates 1 and 2. The inductance 9 in the antenna circuit is coupled through the inductance 10 to any suitable radio transmitting or receiving apparatus.

Figure 2 shows in perspective the concentrated antenna plates shown in Figure 1.

In Figure 3 reference characters 1 and 2 are rotatable plates of the antenna system, corresponding to the stationary type disclosed in Figure 1. These plates are mounted upon conducting rods 7^a and 8^a, and are adapted to be intermeshed with stationary plates 4^a and 5^a. The stationary plates 4^a and 5^a and movable plates 1 and 2 have substantially the same general relation as the plates of the well known rotary variable condenser used in the radio art. The plates 4^a and 5^a form a part of the outer casing of the antennæ which is in direct contact with the earth.

Any suitable dielectric separates the plates, as for example, air or oil. The conducting rods 7^a and 8^a which support the variable condenser plates 1 and 2 pass through protective tubes 11^a and 12^a to the surface of the ground. Operating handles 14 and 15 are rigidly secured to the rods 7^a and 8^a to provide a means for rotating the series of plates 1 and 2. Leads 7 and 8 connect the rods 7^a and 8^a to radio frequency circuit comprising the variable condenser 13 and inductance 9. The inductance 9 is coupled to the inductance 10 which is associated with radio transmitting receiving apparatus.

Experiments have determined that antenna construction similar to those disclosed herein possess features of distinct advantage over underground systems heretofore employed. The concentrated capacity area gives the same effective antenna surface as long buried single wire conductors and give substantially the same signal energy as the long buried conductors. It has been found experimentally, that placing the capacity antenna areas a distance of approximately fifty feet apart radio signals have been received from considerable distance and at high audibility.

The operation of the system may be explained as follows: Radio waves progressing in the earth's crust will induce a charge on the antenna capacity areas due to the electrostatic component of the radio wave and the antenna circuit will oscillate due to the phase relation of the charges impinging upon the capacity areas. Under certain conditions best results are obtained by using smaller antenna capacity areas and therefore the variable antenna capacity system shown in Figure 3 may be utilized for a wide range of wave lengths. Where stations are required for operation on predetermined wave lengths definite capacity areas may be employed as in Figures 1 and 2. However, where it is necessary for stations to communicate with numbers of stations operating at various wave lengths the means such as shown in

Figure 3 may be used to change the effective area of the capacity to obtain syntony with the co-operating station.

In the practical operation of the system it may be found advantageous to have the antenna capacities placed directly beneath the station and allow the rotating handles of the variable antenna capacities to project through the floor so as to enable the operator to readily control the capacity values for various wave lengths. The system as described is not limited to operation over only a small band of wave lengths, but is applicable for long wave operation such for example as employed by high power oceanic stations.

What we claim is;—

1. A radio transmission and reception system comprising an antenna including a plurality of sets of capacity areas buried below the surface of the earth, means for varying their mutual capacity with the earth and a circuit associated with radio signaling apparatus and connected with said sets of capacity areas.

2. In a radio transmission and reception system, an antenna comprising a pair of capacity units buried in the earth each unit including a plurality of movable plates and associated stationary plates insulated therefrom and means for changing the relative position of the plates.

3. In a radio transmission and reception system an antenna comprising a set of metallic plates mounted upon a rotatable shaft, a series of intermeshed stationary metallic plates insulated therefrom and buried in the earth.

4. In a radio transmission and reception system an antenna comprising a plurality of casings buried in the earth, a series of metallic plates within said casings, a second set of metallic plates mounted on a rotatable shaft and intermeshed with said first mentioned plates but insulated therefrom whereby the relative position of the two sets of plates may be varied and a circuit associated with radio signaling apparatus connecting said sets of rotatable plates.

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