

Feb. 13, 1940.

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2,189,910

ANTENNA ARRANGEMENT

Filed Nov. 2, 1937

Fig. 1

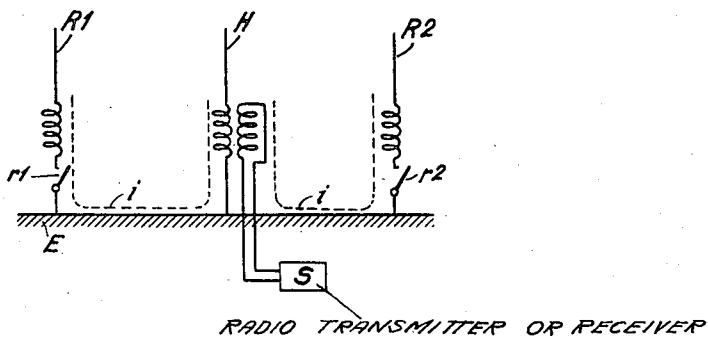
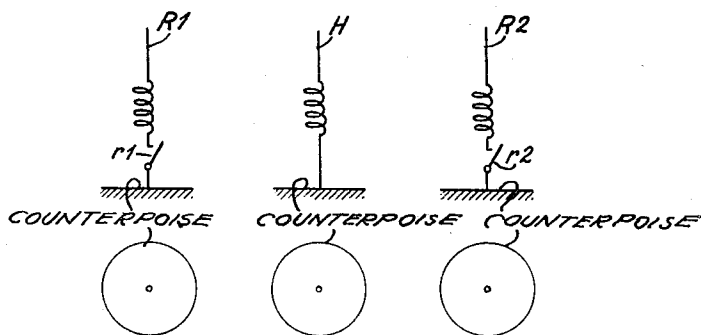


Fig. 2



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UNITED STATES PATENT OFFICE

2,189,910

ANTENNA ARRANGEMENT

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Application November 2, 1937, Serial No. 172,345
In Germany August 25, 1936

4 Claims. (Cl. 250—11)

The present invention relates to antenna arrangements and has for its object to avoid radiation of undesired horizontal components.

Rotatable antenna arrangements in which a continuous dash line is caused to rotate in order to create direction finding, are well known in the art. Means are thereby provided for determining the elapse of time between the transmission of an undirectional signal and the receipt of the continuous dash line. The undirectional signal may be transmitted when the continuous dash line passes through north, for example. It is well known in such cases to employ an antenna arrangement having a permanently supplied radiator, the radiation characteristic of which is alternately displaced by means of two keyed antennae which act as reflectors. The antennae effecting the displacement of the main antenna radiation characteristic are alternately keyed in any known manner, so as to obtain a continuous dash line.

In cases when it seems desirable to reduce the size of an antenna system, the thought may arise to use dipoles having a length equal to $\lambda/4$, instead of dipoles of $\lambda/2$ length, and to tune the former dipoles to earth or to a counterpoise structure. Investigations have proved that such antenna arrangements permit perfect radiation to be obtained under such circumstances only, that the counterpoise structure has a certain magnitude, as reliable and symmetric radiation conditions will otherwise not be secured. However, several difficulties are introduced on realizing the necessary measures, which are obviated according to the invention.

According to one feature of the present invention, each radiator of an antenna arrangement is equipped with a separate counterpoise structure, so as to avoid radiation of an undesired horizontal component.

The inventive idea of the present application will more readily be understood from the following description in conjunction with the attached drawing, in which

Fig. 1 diagrammatically illustrates an arrangement according to a known antenna system, while

Fig. 2 shows a diagrammatical representation of an improved antenna arrangement according to the invention.

The known antenna system in Fig. 1 shows a main antenna H being supplied from a transmitter S. If the antenna arrangement is employed for receiving purposes, the main antenna is associated with a receiver. Two reflectors, R1 and R2 are provided and alternately keyed at their lower ends by means of contacts r1 and r2. The length

of the main radiator H and of the reflectors R1 and R2 is equal to $\lambda/4$. The radiator and the reflectors are tuned with respect to ground. The connection to ground E may comprise a highly conductive surface of plaited meshwork, for instance. It has been found in connection with antenna arrangements operating with vertical $\lambda/4$ antennae and $\lambda/4$ reflectors, that not only vertically polarized waves are radiated as theoretically expected, but also a very essential portion of horizontal components. The occurrence of the horizontal component may be explained in such a manner, that the counterpoise structure itself is excited to oscillations by virtue of the balancing or equalizing currents represented by the dotted line i, these equalizing currents flow between the individual radiators over the earth surface common thereto, whereby radiation with horizontal characteristic is produced.

In order to overcome this disadvantage, the present invention provides one separate counterpoise structure for each individual radiator, as illustrated in Fig. 2. A circular counterpoise structure is located below the main radiator H and is completely separated from the counterpoise structures allotted to the reflectors R1 and R2. A flow of currents having an horizontal component is thereby effectively avoided.

It is readily obvious that the circular shape of the counterpoise structures shown in Fig. 2 is not necessarily required, but that an elongated counterpoise structure having arcuated ends may be employed and subdivided by slots or the like.

Although in special importance in connection with rotatable antenna arrangements as above described and demonstrated merely by way of an example, the inventive idea is by no means limited to this type, but is applicable in similar manner also to fixed systems, not only to arrangements of the radio beacon type as mentioned above, in which reflectors are adapted to cooperate with a radiator, but even to all multi-antenna arrangements (radiation transmitting and receiving systems), in which the suppression of the horizontal component is desirable.

Furthermore, the invention is also applicable in connection with a new proposition according to which the antenna structure is rotated merely with respect to a portion of the counterpoise structure. The rotating part of the antenna structure is thereby capacitively coupled to a larger fixed counterpoise structure. The latter must be sub-divided according to the invention, so as to obtain one individual counterpoise struc-

ture allotted to each radiator. In realizing this idea, the rotation must be effected with respect to an eccentric axis. It is especially suitable in this case to make the capacity between the fixed and the rotating portions of the counterpoise structure smaller than the intrinsic or space capacity of the rotating system.

What is claimed is:

1. A direction finding antenna system comprising a plurality of individual radiators, and a plurality of metal counterpoise-ground structures, each of said counterpoise structures being individually allotted to a corresponding radiator, the counterpoise structures being entirely separated from each other whereby radiation of undesired horizontal components is avoided.

2. A direction finding antenna system accord-

ing to the claim 1 in which one of said radiators is a main radiator and is connected to a radio transmitter, the other of said radiators being reflectors for the main radiator, and means are provided for keying said reflectors.

3. A direction finding antenna system according to claim 1 in which one of said radiators is a main radiator of one-fourth wave length the other radiators being reflectors of one-fourth wave length, the main radiator and reflectors being tuned to one-half wave lengths together with the associated individual counterpoises.

4. A direction finding antenna system according to claim 1, in which the radiator is rotatable with respect to a portion of its associated counterpoise-ground structure.

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