Jan. 5, 1937. K. POSTHUMUS ET AL 2,066,900

ANTENNA

Original Filed Sept. 21, 1933

Fig. 1

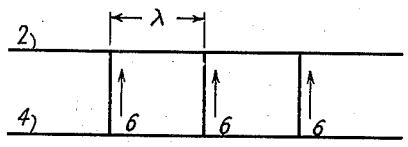


Fig. 2

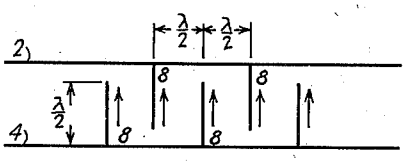


Fig. 3

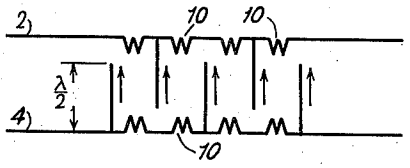


Fig. 4

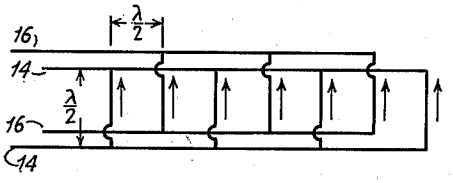


Fig. 5

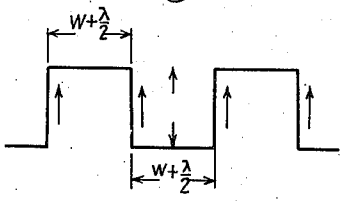


Fig. 6

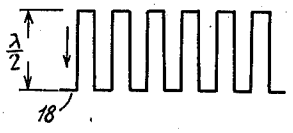
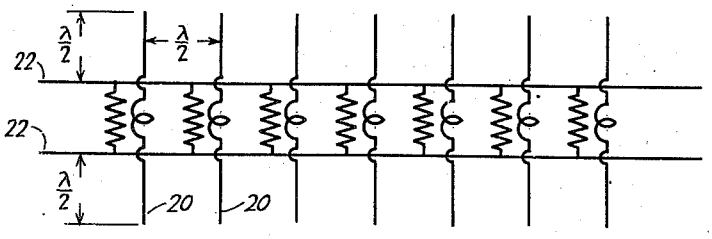


Fig. 7



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UNITED STATES PATENT OFFICE

2,066,900

ANTENNA

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Original application September 21, 1933, Serial No. 690,355, now Patent No. 2,031,065, dated February 18, 1936. Divided and this application September 12, 1935, Serial No. 40,204. In the Netherlands September 19, 1928

5 Claims. (Cl. 250—11)

This invention is a division of our United States Patent No. 2,031,065, granted February 18, 1936, based on an application filed in the United States September 19, 1929, and relates to antenna systems for transmitting and receiving wireless signals. More particularly, the invention provides an arrangement in which a pure directional effect is obtained by means of an aerial system utilizing a plurality of aerials or radiators.

According to the invention, the height of these aerials is substantially equal to or an odd multiple of the half wave length of the oscillations to be transmitted or received, and the said aerials are energized such that the operative direction is at right angles to the plane in which the aerials are located.

In the preferred embodiment, an arrangement is provided in which the spacing of the aerials is a half wave length and each aerial is connected to one of two feeders present such that the energy in all the aerials is in phase. As an alternative, four feeders are provided and each aerial is connected to two feeders such that the energy in all the aerials is in phase. An arrangement may be provided in which the spacing of the aerials is a half wave length and the aerials, which are alternately coupled in opposition, are connected to two central feeders. Alternatively, the spacing of the aerials may be an odd multiple of the half wave length and a single feeder is connected to all the aerials such that the energy in all the aerials is in phase.

The invention will be more clearly understood by reference to the accompanying drawing, in which Figs. 1–7, inclusive, show some embodiments.

Fig. 1 shows an antenna having two feeders **2**, **4** to which the aerials **6** are connected. The aerials are spaced one wave length apart so that they are in phase. This is necessary to secure a directional effect at right angles to the plane of the aerials and this is so in the case with all the aerial systems claimed.

Fig. 2 shows an antenna having likewise two feeders **2**, **4**.

In this case the aerials **8** are spaced a half wave length apart and as shown in the drawing are each only connected to one of the two feeders so as to ensure uniformity in phase.

The arrangement shown in Fig. 3, is identical with that of Fig. 2, but for the width of the aerial system which is reduced by the interconnection of coils **10** in the feeders, such that the spacing of the radiators or aerials is still electrically a half wave length.

Fig. 4 shows an improvement in the arrangement of Fig. 3, the free ends of the aerials **8** shown in Fig. 3 being connected to two feeders **14**, **16** so that the radiation of energy from the feeders, if any, is balanced by the close proximity of a forward and a backward lead. The pairs of feeders **14**, **14** and **16**, **16** are preferably placed close together or they may be separated by an even number of half wave lengths to get proper radiation addition in a direction perpendicular to their length.

Referring to Fig. 5, all the aerials are fed from one single feeder **18** and so are they in Fig. 6, which shows the same antenna construction, but for the spacing of the aerials being very small so that in principle all the aerials are simultaneously in phase if their length is a half wave length. That is to say, by bending adjacent half wave lengths, the currents therein, upon which radiation depends, are made to flow in the same direction. As nevertheless the horizontal spacing is to be slightly taken account of, the length of the aerials will practically be slightly smaller.

Referring to Fig. 7, the aerials **20** are arranged on either side of two central feeders **22**; in order to ensure uniformity in phase at a spacing of a half wave length, the aerials must be alternately coupled in opposition to the feeders.

What is claimed is:

1. A directive antenna system comprising a two wire transmission line, the wires of said line being parallel to each other, parallel radiators connected to each of said wires and all located substantially in a single plane, the radiators connected to one wire of said transmission line being located substantially intermediate the radiators connected to the other wire of said transmission line, said radiators being located between the wires of said transmission line.

2. A directive antenna system comprising a two wire transmission line, the wires of said line being parallel to each other, parallel radiators connected to each of said wires and all located substantially in a single plane, the radiators connected to one wire of said transmission line being located substantially intermediate the radiators connected to the other wire of said transmission line, said radiators having a length substantially equal to one half the operating wave, the radiators connected to the same wire of said line being effectively electrically separated from one another along said wire by the length of the operating wave, said radiators being located between the wires of said transmission line.

3. A directive antenna system comprising a two wire transmission line, the wires of said line being parallel to each other, parallel radiators connected to each of said wires and all located substantially in a single plane, the radiators connected to one wire of said transmission line being located substantially intermediate the radiators connected to the other wire of said transmission line, said radiators having a length substantially equal to one half the operating wave, the radiators connected to the same wire of said line being effectively electrically separated from one another along said wire by the length of the operating wave, adjacent radiators being effectively electrically separated approximately by one-half the length of the operating wave, said radiators being located between the wires of said transmission line.

4. A directive antenna system comprising a two wire transmission line, the wires of said line being parallel to each other, parallel radiators connected to each of said wires and all located substantially in a single plane, the radiators connected to one wire of said transmission line being located substantially intermediate the radiators connected to the other wire of said transmission line, said radiators having a length substantially equal to one half the operating wave, the radiators connected to the same wire of said line being effectively electrically separated from one another along said wire by the length of the operating wave, and impedances serially connected in each wire of said line between adjacent radiators for reducing the area of said antenna system while still maintaining electrically the spacing between said radiators.

5. A directive antenna system comprising a two wire transmission line, the wires of said line being parallel to each other and separated by a distance greater than one-half the length of the operating wave, parallel radiators connected to each of said wires and all located substantially in a single plane, the radiators connected to one wire of said transmission line being located substantially intermediate the radiators connected to the other wire of said transmission line, said radiators being located between the wires of said transmission line.

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