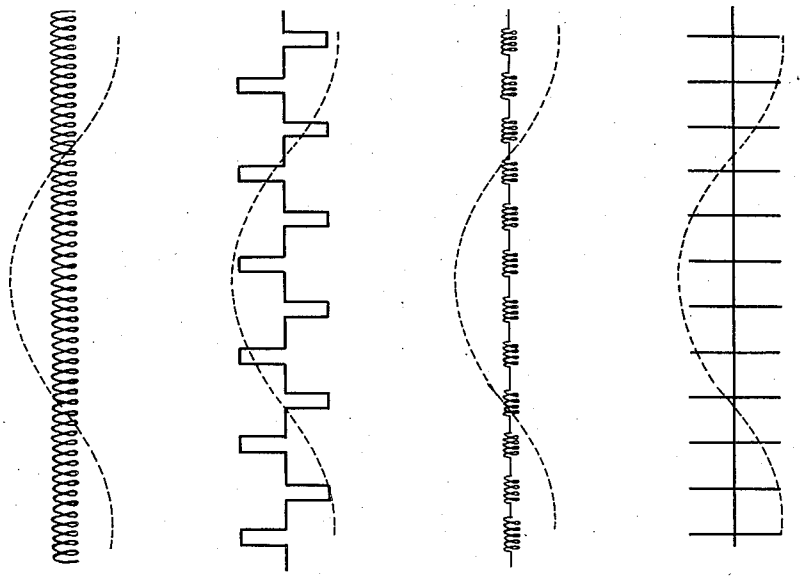
June 25, 1935. H. J. ROUND 2,005,805

AERIAL

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Fig. 1 *Fig. 2* *Fig. 3* *Fig. 4*



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AERIAL

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1 Claim. (Cl. 250—33)

This invention relates to aerials and has for its objects to provide an improved aerial adapted to give a high percentage of its radiation in the direction of its length. Though not exclusively limited to its application thereto, the invention is particularly applicable to vertical aerials for use on comparatively long waves, such as 200 metres or more. The vertical aerials adapted to give a high percentage of radiation upwards rather than horizontally may in practice be required for various purposes. For example, where a high power broadcast transmitter is situated near a large town it may be desired that the transmitter shall comprise an aerial system having this feature in order that the received strength of signal in the said town shall not be too high.

It is well known that a vertical wire whose electrical length is an even multiple of the half wave length, gives a directional diagram in which the horizontal radiation is small but in which energy is radiated mainly upwards at an angle which depends on the electrical length of the aerial. It will be appreciated, however, that with wave lengths of 300 metres it is for practical reasons very difficult to erect an aerial which is equal in length even to one wave length.

According to this invention, an aerial intended to give a high proportion of high angle radiation is made approximately an even plurality of half wave lengths in electrical length and is loaded in such a manner that the standing wave of current in the aerial is disposed in the actual length of the aerial in the same way as it would be in an ordinary straight wire aerial of equivalent electrical length while the actual overall length of said aerial is considerably less than the electrical length. The term "loading" as employed in the present specification is meant to include any arrangement in which the velocity in the aerial is reduced.

The invention may be carried into effect in a variety of ways.

In one way of carrying out the invention, an aerial is folded back upon itself at frequency intervals throughout its length so that the overall height of the aerial remains reasonably small but the electrical length is still an even plurality of half wave lengths.

In another way of carrying out the invention, the loading is effected by inserting small coils at regular intervals in the length of the aerial.

In a third way of carrying out the invention, an aerial is constituted by a helix of wire instead of by an ordinary straight wire.

In yet another way of carrying the invention into effect the aerial is provided with a plurality of short transverse conductors which are constituted by short wires equally spaced from one another the said wires being attached centrally to and running at right angles to the length of a vertical wire.

In general, aerials in accordance with this invention will be arranged vertically, but in some cases in which end-wise radiation in a horizontal direction is required, such aerials may be arranged horizontally or at other angles.

It will be noted that in aerials in accordance with this invention, the total radiation resistance is reduced as compared to a simple straight wire, but as the radiation resistance is already high with a straight vertical wire, the efficiency is not much reduced by a considerable reduction in actual height provided that undesired resistances are kept as low as possible for, as radiation is reduced the same power will give greater currents if the undesired resistances are small.

It will further be observed that in the above described constructions, the wave of standing current will be disposed in relation to the length of the aerial in exactly the same way as is the wave in an ordinary unloaded open aerial oscillating on one or more wave lengths.

It should be understood of course that the interposition of loading in accordance with this invention should be so effected that there is substantially no reflection. To avoid reflection it is, of course, necessary to employ a fairly large number of loading units per wave length in the aerial. In most arrangements the loading units will be at regular intervals though this is not absolutely necessary.

Various arrangements in accordance with the present invention are illustrated in the accompanying drawing.

Referring to Figure 1 this represents an aerial which is approximately an even multiple of a half wave length long and is arranged vertically the desired loading being obtained by constituting the aerial as a helix as shown,

Figure 2 shows an arrangement in which the loading of the aerial is obtained by constituting said aerial with a plurality of portions bent back upon themselves i. e. with a plurality of what may be termed "zigzag" portions,

In Figure 3 the loading is obtained by the insertion of a plurality of coils at close intervals, and,

In Figure 4 the loading is obtained by providing an aerial with a plurality of horizontal ca-

pacity members arranged at close intervals.

In all the arrangements illustrated the standing wave (which is indicated by a broken curve) is of approximately similar form to that which would be obtained in an ordinary aerial without loading.

In some practical cases it may be desired to obtain a certain component of radiation in a direction at right angles to the length of the length of the aerial i. e. in the case of a vertical aerial it may be desired to obtain a certain component of horizontal radiation. This effect when desired may be obtained by constructing an aerial to be not exactly an even multiple of a half wave length long.

Having thus described my invention, what I claim is:

An antenna system adapted to radiate chiefly in the direction of its length, comprising a straight, linear, vertical aerial having an electrical length approximately equal to an even multiple of a half wave, said aerial being loaded uniformly at substantially regular intervals throughout its length with capacity members arranged at right angles to the length of the aerial, the number of said capacity members comprising at least eight to the wave length, said capacity members being supported at their centers by said aerial.

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