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PATENT SPECIFICATION

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PROVISIONAL SPECIFICATION.

Improvements in or relating to Wireless Apparatus.

We, JAMES ROBINSON, HORACE LESLIE CROWTHER and WALTER HOWLEY DERRIMAN, of Instrument Design Establishment, R.A.F., Biggin Hill, Kent, British subjects, do hereby declare the nature of this invention to be as follows:—

This invention relates to improvements in wireless directional transmitting arrangements wherein the antennæ comprise parts which produce a horizontal electric component of the electromagnetic radiation.

In loop aerials, for example, as hitherto proposed, the portions of such aerials which are horizontal or have horizontal components tend to emit electromagnetic waves having the electric component thereof horizontal, while the portions of such aerials which are vertical tend to emit electromagnetic waves having the electric component thereof vertical. The waves having the electric component horizontal are liable, for example, if reflected by the upper conducting layer of the atmosphere or otherwise, to introduce errors in the directional effect.

The present invention has for its object to provide directional transmitting aerial arrangements for emitting electromagnetic waves which are free or practically free from horizontal electric components.

To this end, the invention consists in arranging transmitting antennæ or conductors with the portions which are horizontal or have horizontal components in close proximity to one another and directed in opposite directions, so that the current in one such portion is of opposite direction to the current in another such portion. By these means, the portions of the transmitting antennæ which are horizontal or have horizontal components neutralize each other's effect in emitting electromagnetic waves, and the effective radiation is due only to those portions or

components of the antennæ which are vertical.

According to one arrangement, by way of example, an aerial system comprises two identical open ended aerials each consisting of a lower vertical portion, an intermediate horizontal portion, and an upper vertical portion. The two lower vertical portions are made as identical as possible and are separated apart so as not to have a neutralizing effect on one another. The two horizontal portions are made as identical as possible, are arranged close together and extend in opposite directions, each from its own lower vertical portion to its own upper vertical portion. The two upper vertical portions are made as identical as possible, and are separated apart so as not to have a neutralizing effect on one another. The upper vertical portion of each aerial is arranged in alignment with the lower vertical portion of the other aerial, and the two upper vertical portions may be longer than the two lower vertical portions or *vice versa*.

The transmitter may be connected to the aerials in any suitable manner, for example, the transmitter may be coupled to a coil connecting or connected between the two horizontal portions, or may be coupled to a coil in each horizontal portion.

With such an arrangement, the electromagnetic waves emitted by the horizontal portions of the aerials neutralize each other, and the radiation emitted from the transmitting station as a whole is due to the vertical portions of the aerials.

In a modified arrangement, an aerial system comprises two identical open ended antennæ, having lower and upper vertical portions as just described, but having inclined portions substituted for the horizontal portions just described.

With such an arrangement, the horizontal components of the radiations from

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the inclined portions neutralize each other.

In any of the arrangements referred to, the portions of the aeri-als which are horizontal, or have horizontal components may be arranged in straight lines, in angular arrangements, or otherwise.

The invention is applicable to rotating or stationary aerial systems:-

Dated this 7th day of April, 1922.

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A. C. DAY,
Captain,

Agent for the Applicants.

COMPLETE SPECIFICATION.

Improvements in or relating to Wireless Apparatus.

We, JAMES ROBINSON, HORACE LESLIE
15 CROWTHER and WALTER HOWLEY DERRI-
MAN, formerly of Instrument Design
Establishment, Royal Air Force, Biggin
Hill, Kent, but now of Royal Aircraft
Establishment, South Farnborough,
20 Hampshire, British subjects, do hereby
declare the nature of this invention and
in what manner the same is to be per-
formed, to be particularly described and
ascertained in and by the following
25 statement:—

This invention relates to improvements
in wireless directional transmitting
arrangements wherein the antennæ com-
prise parts which produce a horizontal
30 electric component of the electromagnetic
radiation.

In transmitting loop aeri-als, for
example, as hitherto proposed, the por-
tions of such aeri-als which are horizontal
35 or have horizontal components tend to
emit electromagnetic waves having the
electric component thereof horizontal,
while the portions of such aeri-als which
are vertical tend to emit electromagnetic
40 waves having the electric component
thereof vertical. The waves having the
electric component horizontal are liable,
for example, if reflected by the upper
conducting layer of the atmosphere or
45 otherwise, to introduce errors in the
direction effect.

The present invention has for its object
to provide directional transmitting aerial
arrangements for emitting electromag-
50 netic waves which are free or practically
free from horizontal electric components.

To this end, the invention consists in
a wireless transmitting aerial system
comprising a pair or pairs of vertical
55 portions which are spaced apart, so that
the radiation produced is directional, the
conductors which connect the said vertical
portions together and to the transmitting
apparatus and which are horizontal or
60 have horizontal components being so
arranged that the effective radiation is
due only to those portions or components
which are vertical. By arranging the
conductors which are horizontal or have

horizontal components in close proximity 65
to one another and directed in opposite
directions, the portions of the trans-
mitting antennæ which are horizontal or
have horizontal components neutralize
each other's effect in emitting electro- 70
magnetic waves and the effective radia-
tion is due only to those portions or
components of the antennæ which are
vertical.

The invention thus has a different pur- 75
pose from and does not include a receiv-
ing aerial having vertical portions and
intermediate horizontal or inclined parts
arranged in opposite directions for the
purpose of eliminating influence by 80
electromagnetic radiation.

The invention is illustrated diagram-
matically and by way of example in the
accompanying drawings, in which:—

Fig. 1 shows one form of transmitting 85
aerial; and,

Fig. 2 shows another form of trans-
mitting aerial.

According to the arrangement shown in
Fig. 1 a transmitting aerial system com- 90
prises two identical open ended aeri-als 3,
4, each consisting of a lower vertical por-
tion, an intermediate horizontal portion,
and an upper vertical portion. The two
lower vertical portions are made as 95
identical as possible and are separated
apart so as not to have a neutralising
effect on one another. The two hori-
zontal portions are made as identical as
possible, are arranged close together and 100
extend in opposite directions, each from
its own lower vertical portion to its own
upper vertical portion. The two upper
vertical portions are made as identical
as possible, and are separated apart so 105
as not to have a neutralising effect on
one another. The upper vertical portion
of each aerial is arranged in alignment
with the lower vertical portion of the
other aerial, and the two upper vertical 110
portions may be longer than the two lower
vertical portions or *vice versa*.

The transmitter may be connected to
the aeri-als in any suitable manner, for
example, the transmitter may be coupled 115

to a coil 5 connecting or connected between the two horizontal portions, or may be coupled to a coil in each horizontal portion.

5 With such an arrangement the electromagnetic waves emitted by the horizontal portions of the aerials neutralise each other, and the radiation from the transmitting station as a whole is due to the
10 vertical portions of the aerials.

In the modified arrangement shown in Fig. 2 an aerial system comprises two identical open ended transmitting antennæ 3, 4 having lower and upper
15 vertical portions as just described, but having inclined portions substituted for the horizontal portions just described.

20 With such an arrangement, the horizontal components of the radiations from the inclined portions neutralise each other.

In any of the arrangements referred to, the portions of the aerial which are horizontal or have horizontal components may
25 be arranged in straight lines, in angular arrangements, or otherwise.

The invention is applicable to rotating or stationary aerial systems, or to
30 stationary aerial systems in which a rotary or the like effect is produced by providing a number of fixed aerials to which the transmitter is connected successively or according to a predetermined arrangement.

35 Having now particularly described and ascertained the nature of our said invention, and in what manner the same is to

be performed, we declare that what we claim is:—

1. A wireless transmitting aerial 40 system comprising a pair or pairs of vertical portions which are spaced apart so that the radiation produced is directional, the conductors which connect the said vertical portions together and to the
45 transmitting apparatus and which are horizontal or have horizontal components being so arranged that the effective radiation is due only to those portions or components which are vertical. 50

2. A wireless transmitting aerial system as claimed in Claim 1, wherein the conductors which are horizontal or have horizontal components are arranged in close proximity to one another and
55 directed in opposite directions, so that the effective radiation is due only to those portions or components of the antennæ which are vertical.

3. A directional wireless transmitting 60 aerial arrangement as claimed in Claim 1, and as hereinbefore described with reference to Fig. 1 of the accompanying drawings.

4. A directional wireless transmitting 65 aerial arrangement as claimed in Claim 1, and as hereinbefore described with reference to Fig. 2 of the accompanying drawings.

Dated this 17th day of January, 1923. 70

A. C. DAY,
Captain,
Agent for the Applicants.

[This Drawing is a reproduction of the Original on a reduced scale]

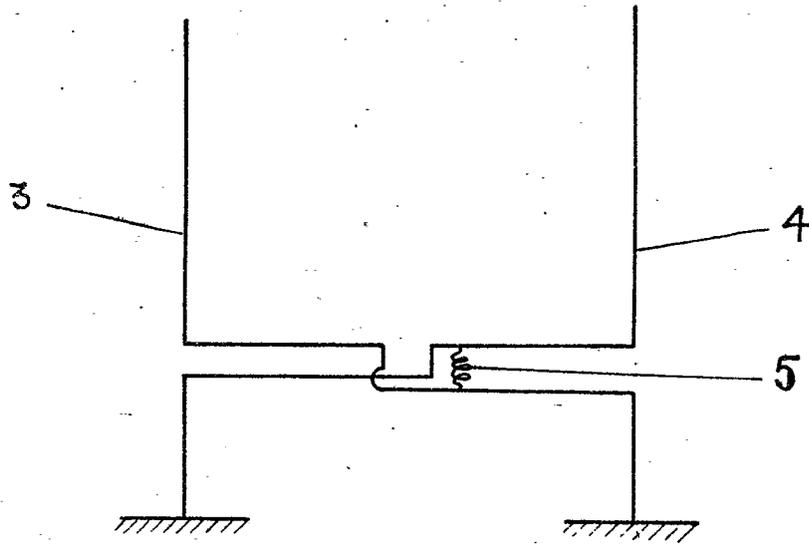


FIG. 1.

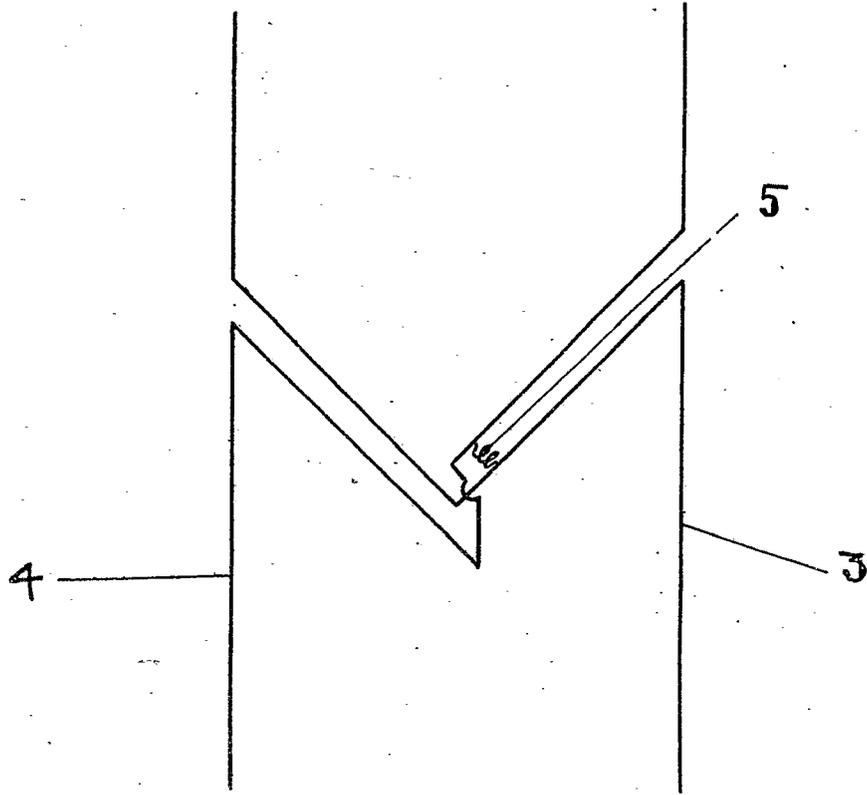


FIG. 2.