

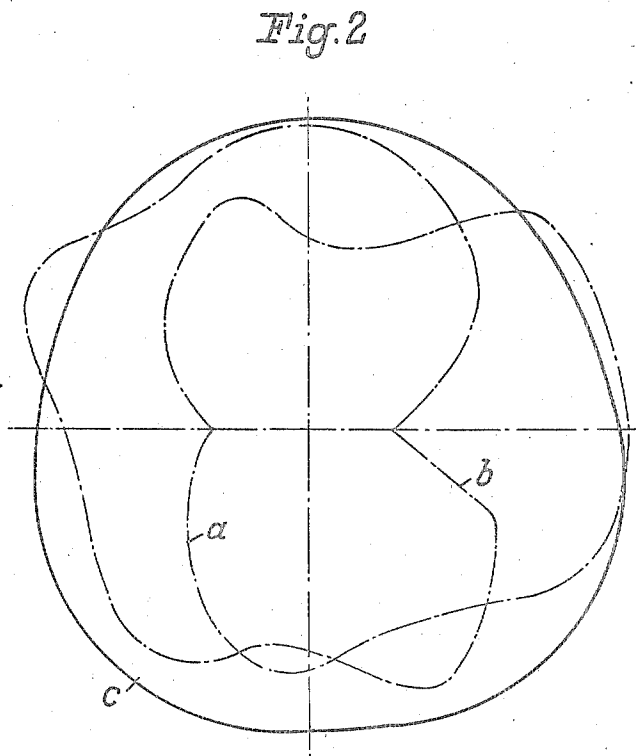
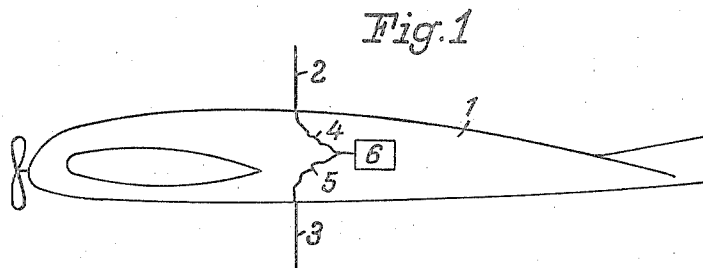
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ANTENNA SYSTEM

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ANTENNA SYSTEM

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This invention relates to antenna systems, and more particularly to antennas employed for wireless signalling on movable vehicles, such as airplanes.

5 An antenna arrangement mounted on board aircraft for receiving and/or radiating space waves customary consists of a vertical dipole extended either upwards or downwards from the body of an aeroplane and connected with a wire-
10 less receiver and/or transmitter through conductors or cables, respectively. However, such arrangement suffers under the fundamental disadvantage that the electromagnetic field received and/or radiated is considerably affected by the
15 metallic structure of an airplane and in particular by the metallic supporting surfaces thereof, from which follows that neither the action of reception nor of radiation is uniform in the horizontal plane, since instead of the desired
20 circular radiation diagrams considerably distorted diagrams are obtained which present one or more maxima or minima, respectively. Such distortion becomes still more harmful when the airplane banks, that is, deviates from a straight
25 line course in which case the supporting surfaces or wings on account of their deviation from the horizontal plane act as additional shieldings. It is thus impossible to assure satisfactory wireless signalling or even to accurately determine
30 the sense of direction of the electromagnetic waves in cases that the antenna means form part of a direction finding system.

It is an object of my invention to provide means in order to satisfactorily eliminate the disadvantages mentioned in the foregoing, and this is achieved according to the main feature thereof by employing in an antenna system of an airplane or the like a plurality of antennas which are simultaneously effective and by so placing
40 these antennas partially on the upper and partially on the lower portion of the airplane that the directional characteristics thereof mutually supplement each other for securing reception and/or radiation which is uniform in each and
45 every compass direction. In one specific aspect of my invention, the antenna system comprises two individual antennas one of which projecting upwards and the other of which projecting downwards from the upper respectively lower
50 part of the airplane. These two antennas are preferably vertical dipoles which in accordance with a further feature of this invention are positioned in alignment the one above the other above and below the airplane.

55 This novel facility involves the beneficial fea-

ture that the antenna system will receive uniformly from and radiate uniformly into each and every compass direction since the effective directional characteristic thereof will not be influenced when the supporting surfaces are moved
5 out of the horizontal plane in response to a deviation from the straight course line of flight.

My invention will be more readily understood from the following description taken in conjunction with the accompanying drawing, in which
10 Fig. 1 schematically shows an airplane which is provided with an antenna system according to this invention, while Fig. 2 shows radiation diagrams explanatory of my invention.

Fig. 1 schematically shows an airplane which is provided with an antenna system according to this invention, while Fig. 2 shows radiation diagrams explanatory of my invention.
15 In Fig. 1 reference numeral 1 denotes the metallic structure of an airplane. An upper vertical dipole 2 and a lower vertical dipole 3 disposed in alignment with one another are insulatingly fixed on the upper respectively lower part of the airplane and are connected preferably
20 in parallel to a wireless receiving and/or transmitting apparatus 6 through conductors 4 and 5, respectively.

The different horizontal directional characteristics of the antenna arrangement of Fig. 1
25 are shown in Fig. 2. The diagram *a* is that of the upper vertical dipole 2 alone and the diagram *b* is that of the lower vertical dipole 3 alone. The two diagrams *a* and *b* are not congruous but the one is substantially the true reflection or
30 image of the other since the minimum of the one diagram is located almost in the maximum of the other diagram. Because of the fact that the two vertical dipoles originating these diagrams are connected in parallel to the wireless
35 signalling apparatus, the resultant diagram *C* is obtained which presents neither minima nor maxima and which substantially involves circular shape. Now, if the airplane differs from the straight course so that the supporting surfaces
40 become inclined with respect to the horizontal plane, each of the individual radiation diagrams is subjected to a change but the resulting diagram *C* of the two individual diagrams in cooperation with one another remains substantially
45 unchanged. It is thus possible as a result of the novel antenna arrangement as proposed in this invention to secure reception and/or radiation which is uniform and equal in all compass directions whether the airplane flies on a
50 straight course line or banks.

The facility according to this invention to vertically mount the two dipoles in alignment one above the other involves the further advantage that no additional directional action is set
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up in the horizontal plane in response to transit time differences between the two individual dipoles.

What is claimed is:

- 5 1. A wireless signalling equipment for use on board aircraft comprising a wireless signalling apparatus, an antenna system consisting of two individual antennas substantially omnidirectional in the horizontal plane of the craft one positioned above and the other disposed below said
10 aircraft in substantially vertical alignment with one another and each normally setting up a radiation diagram subject to deformation by said air-

craft, and means for connecting said upper and said lower antenna in parallel to the said wireless signalling apparatus for simultaneous operation whereby said radiation diagrams mutually supplement each other to produce a resultant radiation diagram of substantially circular configuration and uniform action in all compass directions. 5

2. The invention according to claim 1, characterized in that the said individual antennas are vertical dipoles. 10

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