LINEAR SLOT ANTENNA WITH V-SHAPED LENS AT APERTURE
ABSTRACT OF THE DISCLOSURE

A radar antenna with a linear source consisting of a slotted wave guide in front of which is located an array of metal fins for froming the desired polarization, and with a directivity forming element, including a dielectric element consisting of an approximately U-shaped structure with slightly spread apart legs, inside of which, by means of an adhesive, there is glued a second V-shaped element.

The present invention relates to a linear antenna which obtains its directivity in the plane perpendicular to the line by means of a cylindrical dielectric structure. Said antenna is characterized in that said cylindrical dielectric structure is fed from an array of slots cut on one of the sides of a wave guide, in order to obtain the directive radiation in a plane containing the array: the dielectric structure is embodied with two parallel layers of insulating material consisting for instance of a resin and glass fiber conglomerate, and ending at their front ends with a semi-cylindrical fitting.

In order to suppress the undesired polarization components, use is made of an array of thin metal fins firmly positioned on the element carrying the slotted wave guide.

According to the present invention, the radar antenna consists of a radiating linear source mounted within a U section, and of a dielectric structure for forming the beam in the vertical plane, which, includes, inside, a second V-shaped section member, made of dielectric material, the apex of which is turned towards the radiating linear source. This dielectric structure is made of glass fiber fabric and polyester resin stabilized against the erosive action of the ultraviolet radiation. The structure also is partially filled within a material electrically transparent to the microwaves, serving the purpose of stiffening the structure.

The antenna will now be described with reference to the attached drawings, wherein:

FIGURE 1 is a perspective view with some parts removed of the antenna;
FIGURE 2 is a front elevational view of the antenna of FIGURE 1;
FIGURE 3 is a cross sectional view taken along the plane A—A of FIGURE 2.

The antenna includes a wave guide 3, with slots through its narrow side, forming an array of elementary radiators. Each slot radiates in a limited space defined by two metal plates 4. The two metal plates 4 constitute a single U-shaped element in the closed part of which 4a the wave guide 3 is fixed by means of an adhesive. The metal fins 2 located in front of the radiating slots of the guide 3 are mounted in cuts 2a provided in the U-shaped member 4 to which said fins are fastened by means of an adhesive.

Downstreams of the metal fins, the matching of the wave impedance, between the field inside the metal plates 4 and the field sustained by the radiating dielectric structure is obtained by shaping the structure itself. The dielectric structure 1, according to the present invention, is embodied by a sheet element 1a made of fiber glass and resin conglomerate having a uniform thickness and being U-shaped, with its legs slightly spread apart, within which is glued by an adhesive a V-shaped second element (1b of FIGURE 1) of the same material. The terminal parts of said V-shaped element are bent so as to follow the contour of the U-shaped element 1a to which they are glued. The elements 1b and 1d made of material electrically transparent to the microwaves serve the purpose of mechanically strengthening the structure.

The antenna can be fed through one end thereof as shown in FIGURE 2 or at its center. The end or ends of the slotted guide are terminated either by a metal plate or by a microwave absorber, depending upon the desired type of radiating array (stationary wave or traveling wave).

The present invention has been described with reference to one embodiment at present preferred, but it will be understood that changes and modifications might be brought thereto without departing from the scope of the present industrial privilege.

We claim:
1. A radar antenna comprising a linear source with a wave guide, a linear array of radiating slots cut on one of the sides of said wave guide, a dielectric element associated with said wave guide to obtain the directive in the plane perpendicular to said linear source consisting of a first linearly extending part having an approximately U-shaped cross section with slightly spread apart legs and a second linearly extending part having a V-shaped cross-section glued within said first linearly extending part.
2. An antenna as claimed in claim 1 wherein an insert of material electrically transparent to the microwaves is provided to partially fill the space defined by said two parts forming the dielectric element.
3. An antenna as claimed in claim 1 wherein an array of metal fins is arranged in part of the radiating slots of said waveguide within cuts provided in a metal linearly extending element having an approximately U-shaped cross-section within which said waveguide is arranged, said array of metal fins forming together with the legs of the U-shaped metal section large waveguide blocks for suppressing an undesired polarization component.

References Cited

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