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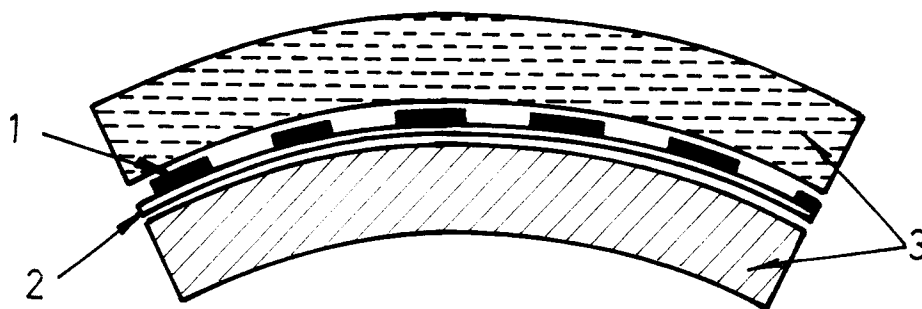
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(54) **Reflecting elements incorporated into aerospace structures for telecommunications**

(57) Reflecting elements incorporated into aerospace structures for telecommunications. They consist of a support (2) based on a radiotransparent plastic film which bears a partial covering of conducting materials which assumes a geometrical shape in which a pattern suited to the desired function is repeated. The support (2) with its covering is incorporated within a dielectric structural support (3) which can assume various forms

(thin membrane, single sandwich, double sandwich, triple sandwich and other more complex configurations) and in which the reflecting elements (1) are located in the position determined by the needs of the sought-after application, the incorporated elements (1) forming the surface for reflecting the radioelectric signals and furthermore serving to discriminate the radiofrequency signals. The invention is applicable to the field of satellite telecommunications.



EP 0 803 931 A2

Description

Field of the invention

The present invention relates to a reflecting element incorporated into a dielectric structural support of standard or more complex type, which is radiotransparent at the frequencies of use. The dielectric structural support of standard type can assume the form of a thin membrane, single sandwich, double sandwich, triple sandwich etc. The element incorporated into the said structural support forms the radioelectric signal reflection surface and can be used moreover as a radiofrequency signal discrimination element.

The invention is applicable in particular to aerospace structures for satellite telecommunications.

Prior art

The prior art is already concerned with the inclusion of reflecting elements within structures used in antennas and in other applications. Thus, the document EP-A-0 305 267 describes a procedure for making a set of electrically conducting motifs on an insulating surface of complex shape, which starts from a plastically deformable plane support on a face of which is arranged the aforesaid set of motifs and which is applied under deformation against the said surface of complex shape, securing it to the latter. The product resulting from this procedure can be applied to the construction of reflectors for antennas.

The document EP-A-0 502 944 relates to an antenna for transmitting or receiving electromagnetic radiations, whose dish is totally or partially transparent to visible light and, in one embodiment of the invention, contains a metal gauze which reflects a particular band of microwave radiation, and which is inset between two plastic laminae.

The document EP-A-0 595 418 relates to a parabolic reflecting antenna which comprises an injection-moulded plastic body which encloses a network of electrically conducting material having the function of electromagnetic reflector.

Summary of the invention

Although the prior art documents just discussed cover products with incorporated reflecting elements, none of them has tackled nor, therefore, solved the problem addressed by the present invention, namely, the creation of reflecting elements incorporated into dielectric structures, especially aerospace structures for telecommunications, which are radiotransparent at the frequencies of use and which, besides reflecting the radioelectric signal, can also serve to discriminate the radiofrequency signal.

The invention solves the addressed problem using reflecting elements of the class specified at the outset

and which can be embodied as a support based on a radiotransparent plastic film with a covering of conducting materials which is partial and which assumes a geometrical shape in which a pattern suited to the desired function is repeated. The conducting materials may be chosen from among conducting metals such as copper, aluminium, silver and gold, or else can consist of other conducting or semiconducting materials. The geometrical repeat pattern of the said covering can be continuous or exhibit the form of a grid of vertical, horizontal or inclined bands, and can even assume more complex forms.

Alternatively, the incorporated reflecting element can consist of a hybrid weave of radiotransparent materials and reflecting materials which form the desired patterns. These materials can be chosen from among carbon fibre, aluminium, copper and other conducting metals.

Moreover, the incorporated reflecting element can consist of a combination of wires, bands or other guises of insulated conducting materials.

The reflecting element is incorporated within its structural support during the process of manufacture thereof, locating it therein in the position determined by the needs of the sought-after application.

Brief description of the drawing

The invention will be described below in greater detail while referring to the appended drawing, the single figure of which shows a cross-section of an aerospace structure with incorporated reflecting element.

Detailed description of the invention

As may be noted in the figure of the drawing, the reflecting element 1 of the invention is arranged on a support 2, the support/reflecting element assembly being incorporated between two faces of a dielectric structural support 3. The locating of the reflecting element 1 within the dielectric structural support 3 is achieved during the process of manufacture of the latter, the position in which the reflecting element ought to be mounted so as to better satisfy the needs of the desired application thereof also being chosen at the dielectric structural support manufacturing stage.

Various embodiments of the reflecting element 1 of the invention are possible. In accordance with a first embodiment, this element consists of a radiotransparent plastic film bearing a partial covering of conducting materials which assumes a geometrical shape in which a pattern suited to the desired function is repeated. This pattern can be continuous or take the form of a grid of vertical, horizontal or inclined bands, or can even exhibit more complex forms.

There is a series of conducting materials which could be used to form the covering of the radiotransparent plastic film of the reflecting element 1 of the inven-

tion. Among these materials are conducting metals such as copper, aluminium, silver or gold, as well as other conducting or semiconducting materials.

In accordance with a second embodiment of the invention, the incorporated reflecting element 1 can consist of a hybrid weave of radiotransparent materials and reflecting materials which form the desired patterns. In particular, carbon fibre, aluminium, copper and other conducting metals enter into consideration as examples of radiotransparent materials and reflecting materials.

In accordance with a third embodiment of the invention, the incorporated reflecting element 1 can be formed by wires, bands or other guises of insulated conducting materials.

Experiments carried out with the incorporated reflecting elements according to the invention have demonstrated that they allow appropriate reflection of the radioelectric signals desired and, furthermore, provide optimum discrimination of the radiofrequency signals. Moreover, given that the said reflecting elements are incorporated into dielectric structural supports, they are fully protected against impairment caused by handling or attack produced by agents of miscellaneous nature, thus resulting in the said elements being able to continue to accomplish their job perfectly even in the harshest working conditions of aerospace structures employed for telecommunications.

Although the invention has been described in the foregoing with reference to what are currently regarded as its preferred aspects, those skilled in the art will comprehend that it will be possible to introduce modifications of form and detail into the incorporated reflecting elements of the invention, without thereby departing from the spirit and scope thereof. Therefore, the invention is deemed to be limited solely by the content of the appended claims.

Claims

1. Reflecting element incorporated into a dielectric structural support (3) which can assume the form of a thin membrane, single sandwich, double sandwich, triple sandwich and other more complex forms, and in which, during its manufacturing process, the reflecting element (1) is incorporated in such a way that it is located in the position determined by the needs of the sought-after application, the incorporated element (1) forming the radioelectric signal reflection surface and moreover serving for radiofrequency signal discrimination, characterized in that it consists of a support (2) based on a radiotransparent plastic film which bears a partial covering of conducting materials which assumes a geometrical shape in which a pattern suited to the desired function is repeated.

2. Incorporated reflecting element according to Claim

1, characterized in that the conducting materials which form the said covering are selected from among conducting metals such as copper, aluminium, silver and gold, as well as from among other conducting or semiconducting materials.

3. Incorporated reflecting element according to either one of Claims 1 and 2, characterized in that the geometrical repeat pattern of the said covering is continuous.

4. Incorporated reflecting element according to either one of Claims 1 and 2, characterized in that the geometrical repeat pattern of the said covering exhibits a form selected from among the form of a grid of vertical, horizontal or inclined bands and other more complex forms.

5. Incorporated reflecting element according to the preamble of Claim 1, characterized in that it consists of a hybrid weave of radiotransparent materials and reflecting materials which form the desired pattern.

6. Incorporated reflecting element according to Claim 5, characterized in that the radiotransparent materials and the reflecting materials which constitute the said hybrid weave are selected from among carbon fibre, aluminium, copper and other conducting metals.

7. Incorporated reflecting element according to the preamble of Claim 1, characterized in that it consists of a combination of wires, bands or other guises of insulated conducting materials.

