

RADAR CAMOUFLAGE MATERIAL

The invention relates to radar camouflage material comprising a woven fabric and a plastics layer laminated thereonto.

Radar camouflage devices in web or tarpaulin form, in which metal fibrils are inserted into the fabric in order to mask against detection by radar are known to the art. Because the metal fibrils are conductive, they are excited by the energy applied thereto, thereby partly absorbing and partly reflecting said energy. Examples of such constructions are illustrated in U.S. Patent Specification No. 3 733 606.

Metal has also been used in forms other than fibrils, and the U.S. Patent Specification No. 3 300 781 proposes the use of metal-coated plastic layers, which can be crumpled or crinkled to break up the metal coating.

One problem experienced with these known constructions is that they cannot be made to function satisfactorily within a number of radar wavelength ranges. The most common wavelength ranges used for detection by radar are the X-band, the 35GHz-band and the 94GHz-band.

The radar reflection obtained must be of the right magnitude, since it needs to provide a radar picture which coincides with the surroundings. In the known method in which metal fibrils are woven into the fabric, a certain percentage of the fibrils must be woven relatively spatially, since otherwise the reflection might be too high; and the threads must not lie too close together. A suitable thread density is 7 threads per cm. At high frequencies however (94GHz), problems arise in the form of excessive transmission through the meshes.

If metal foil is used instead, the reflection quickly becomes too high, while when the metal is vaporized onto a plastics film, e.g. polyester, a perfect mirror for radio waves is obtained. This layer however is highly sensitive to cracks occurring when the fabric is flexed

or folded; a fact which can also be gathered from the
aforementioned U.S. Patent Specification No. 3 300
781. The risk of cracks occurring is also high in
the case of laminated structures. Reflection of the
longer radar wavelengths is impaired in such cases.

An object of the present invention is to
provide an improved radar camouflage material which
will function satisfactorily over a wide range of
wavelengths for radar waves.

According to the present invention, a radar
camouflage material comprises a woven fabric and a
plastics layer laminated thereon, characterized by
the fabric incorporating electrically conductive
fibres which are finer than 20 μm ; there being
between the plastics layer and the fabric a thin
metallic layer which has been crinkled during
lamination of the plastics layer onto the fabric; and
the plastics layer being of a material having low
emission factors within the wavelength ranges of 3-5
and 8-14 μm .

The electrically conductive fibres suitably
have a length greater than 3 cm.

The invention will now be described in more
detail with reference to an embodiment thereof
illustrated in the accompanying drawing, in which
Figure 1 illustrates the reflection as a function of
the wavelength in mutually different kinds of
reflective materials; and Figure 2 illustrates an
embodiment of the invention.

In Figure 1, the broken-line curve illustrates
the wavelength dependency of the reflection for a
fabric incorporating metal fibres which thus falls
from 60% reflection at a wavelength of 30 mm to 2.5%
reflection at 3 mm.

Corresponding values for a combined camouflage
structure according to the invention have been shown
by rings, from which it will be seen that at 3 mm the
reflection ability of the structure has increased to
40%.

The reflection ability at a wavelength of 0.01 mm is 30%. If the metallic surface had been on the outside, a substantially higher value would have been attained, but in the illustrated case the polymer in the foil acts to
5 suppress the reflection ability of the structure to a suitable value.

Exemplary embodiment

A polyamide woven fabric 1 having 13/13 threads per cm was used as a carrier, in which each alternate
10 thread was a solid drawn multifilament, while each other thread is spun and contains a few percent of metal fibrils which prior to being spun are finer than 20 μ m in diameter and longer than 3 cm in length. The spun threads are
15 needed in order to incorporate the metal fibre, while the solid drawn threads improve the tensile and tear strength of the fabric.

The fabric 1 is initially coloured green, to impart camouflaging properties thereto. The fabric is laminated to a vacuum-metallized polyethylene foil 3 with an inter-
20 mediate glue layer 2, while applying heat, as illustrated in Fig. 2. A matted release carrier 5 is included in the laminate, to furnish the polyethylene foil with a matte surface.

The heat and pressure to which the fabric is sub-
25 jected also causes it to sink partially into the metallized surface 4 and impair its electroconductive properties. The surface 4 of the metal also crinkles as the polyethylene 3 melts partially during the laminating process.

The previously described result was achieved with
30 this foil.

CLAIMS

1. A radar camouflage material comprising a woven fabric and a plastics layer laminated thereon, characterized by the fabric incorporating electrically conductive fibres which are finer than 20 μm ; there being between the plastics layer and the fabric a thin metallic layer which has been crinkled during lamination of the plastics layer onto the fabric; and the plastics layer being of a material having low emission factors within the wavelength ranges of 3-5 and 8-14 μm .
2. A radar camouflage material as claimed in claim 1, characterized in that the fibres have a length greater than 3 cm.
3. A radar camouflage material as claimed in claim 1 or 2, characterized in that the plastics layer is polyethylene; and that said layer is bonded to the fabric by means of a glue film.
4. A radar camouflage material substantially as hereinbefore described with reference to and as shown in the accompanying drawing.
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