

[54] **MICROWAVE HORN AERIAL WITH
SPIRAL CORRUGATED INNER
SURFACE**

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[56]

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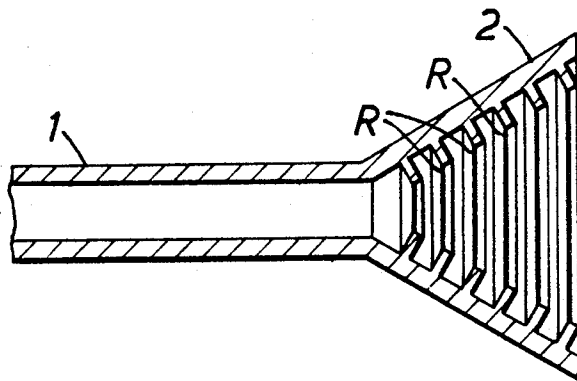
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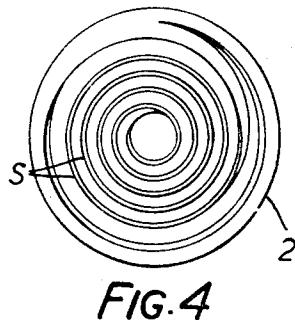
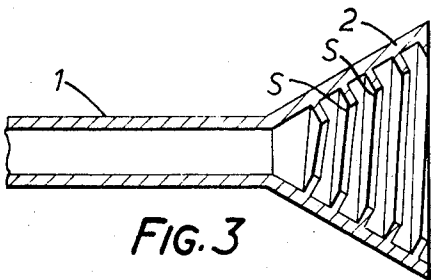
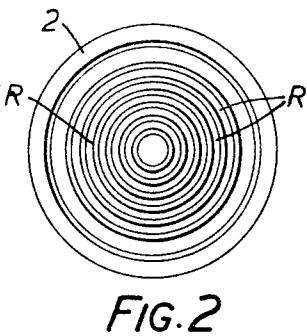
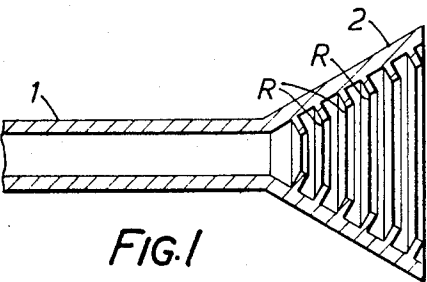
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ABSTRACT

A microwave horn aerial is corrugated on its inner surface by being formed, e.g. by a screw cutting operation with a single start spiro helical groove or by moulding on a mandrel. In the latter case manufacture is relatively easy because the mandrel can be withdrawn by unscrewing it.

6 Claims, 4 Drawing Figures





MICROWAVE HORN AERIAL WITH SPIRAL CORRUGATED INNER SURFACE

This invention relates to microwave horn aerials, that is to say to microwave aerials constituted by tapered lengths of wave guide or flared or tapered dishes. More specifically, the invention relates to so-called corrugated microwave horn aerials, by which expression is meant, in this specification, internally grooved or ringed microwave horn aerials.

A typical known corrugated microwave horn aerial is shown in sectional elevation and end view respectively in FIGS. 1 and 2 of the accompanying drawings.

Referring to these figures, a length of wave guide 1 opens into a flared or conical horn 2. A plurality of annular inwardly projecting rings R are formed on the inner wall of the horn 2. The principal advantage obtained by providing these rings is, as is known, that they result in a considerable reduction of side-lobes and frequency-dependent distortion as compared with an otherwise similar horn having a smooth interior surface. The underlying theory and explanation of the obtaining of this advantage is somewhat complex but, for an understanding thereof, reference is directed to "small aperture, small flare angle corrugated horns" by Bahret and Peters, I.E.E.E. Transactions on Antennae and Propagation, July 1968.

Corrugated microwave horn aerials as at present known have, however, the important defect of being expensive to manufacture, as will be apparent from a consideration of FIGS. 1 and 2. Indeed, the cost of making an aerial as shown in FIGS. 1 and 2 is such that, in many cases, internally smooth horn aerials are adopted despite their inferiority electrically to a horn aerial, as shown in the said FIGS. 1 and 2. Especially does manufacture become costly and difficult when the horn taper is small, the horn long and the number of rings large.

The present invention seeks to provide improved microwave horn aerials which shall be as good as or at any rate comparable in their radio qualities with known microwave horn aerials but shall nevertheless be substantially less expensive to manufacture.

According to this invention, a microwave horn aerial is corrugated by forming or otherwise providing the inner surface thereof with at least one spiro-helical groove or projection.

Preferably there is only one groove or projection but there may be two or more in two- or multi-start arrangements.

It will be appreciated that the invention enables a

corrugated microwave horn aerial to be manufactured in a relatively cheap and easy manner, for example, by using a simple screw cutting technique. Again, in the case of an aerial formed by casting, moulding or spray forming on a core or mandrel, manufacture is cheapened because the core or mandrel does not have to be collapsed to be withdrawn but can be withdrawn by unscrewing it.

The invention will be further described and illustrated by way of example with reference to FIGS. 3 and 4 of the accompanying drawings which are respectively a sectional elevation and end view of one embodiment of the invention.

Referring to FIGS. 3 and 4 a length of wave guide 1 opens into a flared or conical horn 2. The inside wall of the horn 2 is, however, corrugated by being formed, e.g. by a screw-cutting type of operation, with a single-start spiro-helical groove S. Despite its simplicity and relative cheapness of manufacture, the radio performance of a horn aerial as shown in FIGS. 3 and 4 is as good as, or acceptably nearly as good as that of an otherwise comparable horn aerial as shown in FIGS. 1 and 2.

I claim:

1. A corrugated microwave horn aerial comprising a horn body having an inner surface defining a tapered waveguide, and means on said inner surface for reduction of side lobes and frequency distortion of microwave energy propagated therefrom, said means comprising at least one spiro-helical projection on said inner surface.

2. A corrugated microwave horn aerial as defined in claim 1 wherein said projection is of substantially uniform height throughout.

3. A corrugated microwave horn aerial comprising a horn body having an inner surface defining a tapered length of waveguide adapted to be coupled at the smaller end thereof to a source of microwave energy, and at least one spiro-helical projection on said inner surface.

4. A corrugated microwave horn aerial as defined in claim 3 wherein said projection extends substantially from said smaller end of the waveguide to the opposite larger end thereof.

5. A corrugated microwave horn aerial as defined in claim 4 wherein said projection is of substantially uniform height throughout.

6. A corrugated microwave horn aerial as defined in claim 3 wherein said projection is of substantially uniform height throughout.

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