Aug. 7, 1945. J. C. QUAYLE 2,381,367

GUIDES FOR THE TRANSMISSION OF ELECTRIC WAVES

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FIG. 1.

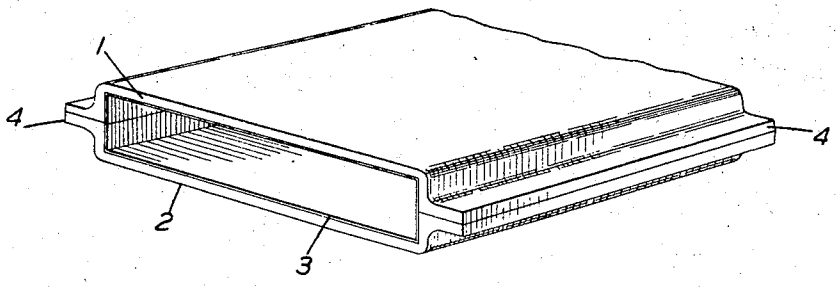
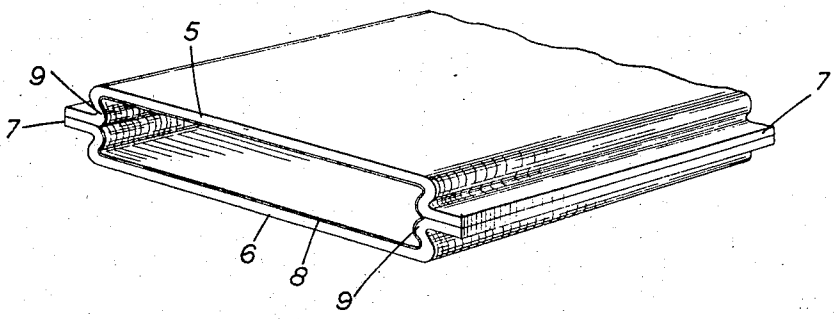


FIG. 2.



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GUIDE FOR THE TRANSMISSION OF ELECTRIC WAVES

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3 Claims. (Cl. 178—44)

This invention is concerned with the manufacture of guides of tubular form and rectangular cross-section for the transmission of electromagnetic waves. The object is to provide a form of tubular guide which shall have a substantial degree of flexibility sufficient to permit change of direction of the guide in gradual bends and twists.

The improved guide is made of flexible non-metallic material in two parts (or more) so as to make a tube with two (or more) longitudinal joints and having the interior surface metallised all over. The longitudinal division is necessary in order that effective metallisation of the interior surface may be carried out. It will generally be most convenient to make the tube from two members; thus giving a minimum number of joints, but it may in some cases be advantageous to use more members. The longitudinal joints are made in such a way as to avoid producing any appreciable break in the metallised surface. A convenient form of member is that of a rectangular trough. Two similar troughs may be used to produce the rectangular tube, or a single trough with a flat strip may be employed. It will generally be advantageous to flange the edges of the troughs so as to facilitate the jointing. This may be done by cementing or by the use of pressure, with or without heat, or by the application of external clamps or otherwise.

The invention is illustrated in two forms by the accompanying drawing, which shows perspective views.

In Figure 1 the wave guide is made up of two similar moulded shallow troughs 1 and 2, each provided with a pair of flanges 4 by which the two troughs are joined together by cementing, so as to form a closed tube. Before the two troughs are assembled together, each of them is provided with a coating of metal 3 on the inner surface.

Figure 2 follows the same method of construction. There are here, again, two shallow troughs 5 and 6 joined together at their flanges 7 and metallised on their inner faces at 8. There is, however, the difference that the sides of the trough are not straight but are waved as shown at 9. This difference gives greater flexibility for bending the tubular guide in one plane.

The material will be chosen having regard to a number of practical considerations, noting that its function is mechanical and not electrical. It has to support the metallisation while permitting sufficient bending and twisting for the gradual change of direction required. A large number of materials are available; some of them will now be mentioned. These include rubber, both in the vulcanised and in the unvulcanised form; the latter being, for instance, a rubber-wax composition. They also include artificial rubber, such as neoprene, and rubber-polystyrene mixtures or co-polymers. Many of the so-called artificial resins are also suitable, for instance, polyvinyl resins and the normally solid polymers of ethylene.

A number of different methods of metallisation are available. The methods used must give a sufficiently complete covering with a smooth surface. Metal spraying or painting with appropriate metal paint may be employed. Other processes, such as sputtering and evaporation in vacuo may also be used.

Tubular guides of the forms described and illustrated have, in a generally non-metallic construction, the property that they provide sufficient rigidity for efficient transmission of the electric waves and sufficient flexibility to permit the guide to be bent and twisted to suit the positions in which it is required to be used. In using such guides for electric waves of the lowest frequency which can be transmitted through such rectangular tubes, it is important to maintain substantially invariable the longer dimension of the tube. This condition is complied with by the present guide form which is stiff enough to resist any appreciable change of the longer dimension of the rectangle; at the same time, particularly in the form shown in Figure 2, it permits of bending in one plane and twisting about the axis of the tube. These two possibilities permit it to accommodate itself to all ordinary forms of run of the guide. Variation in the smaller transverse dimension of the tube which may occur in bending of the tube, particularly in the case of Figure 2, is permissible within limits, since this dimension can be varied considerably without producing corresponding variation in the attenuation of the electric waves in their transmission through the tube.

What I claim as my invention is:

1. A rectangular tubular wave guide consisting of at least two parts of flexible non-metallic material having their interior surfaces metallised, said parts being connected together by longitudinal joints characterized by the absence of any appreciable break in the metallised surface of the rectangular cross-section.

2. A rectangular tubular wave guide consisting of two parts of flexible non-metallic material, one part being a rectangular trough and both parts having the interior surfaces metallised, said parts being connected together at their edges by joints characterized by the absence of any appreciable

break in the metallised surface of the rectangular cross-section.

3. A rectangular tubular wave guide consisting of two parts of flexible non-metallic material with the interior surfaces metallised, each part being in the form of a shallow trough having a flat bottom and waved ends whereby to provide added flexibility in one plane, the two troughs being joined together at their edges by joints characterized by the absence of any appreciable break in the metallised surface of the rectangular cross-section.

JOSHUA CREER QUAYLE.