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Spinner et al.

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[54] WAVEGUIDE TRANSITION

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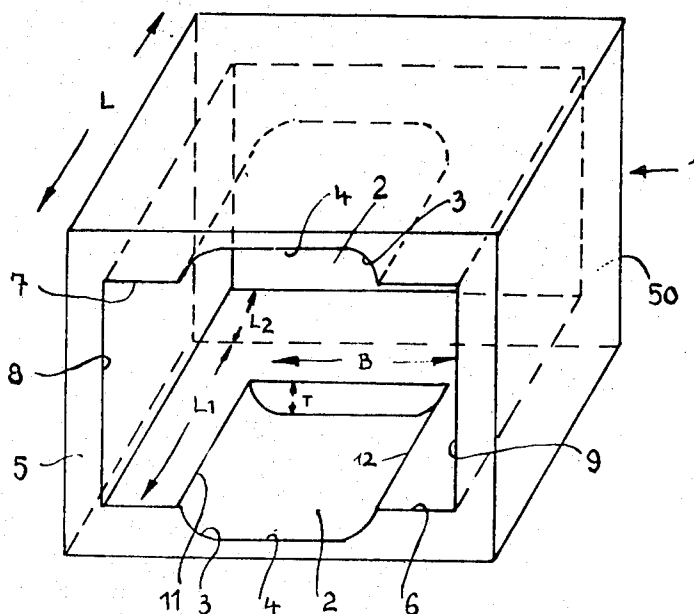
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[57] ABSTRACT

The specification describes a transition transformation
part for leading from a preferably oval smooth or cor-
rugated waveguide to a rectangular cross-section. For
producing a transformation stage recesses are formed
in opposite broad sides of the rectangular passage in
the structure.

10 Claims, 2 Drawing Figures



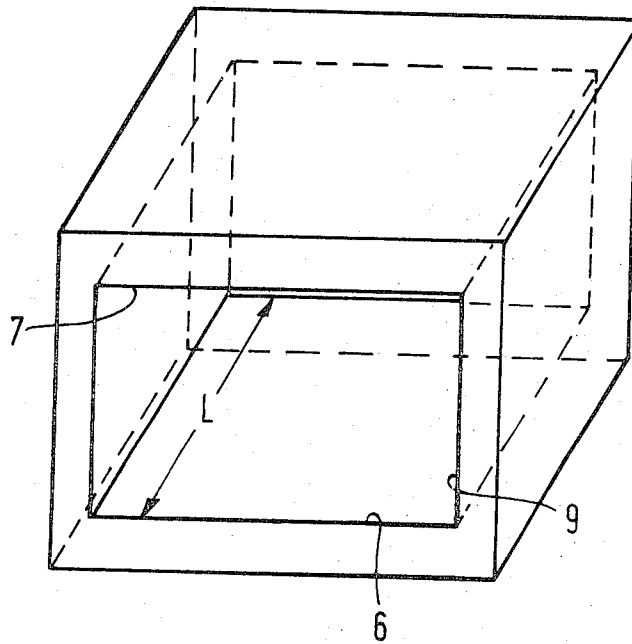


Fig. 1

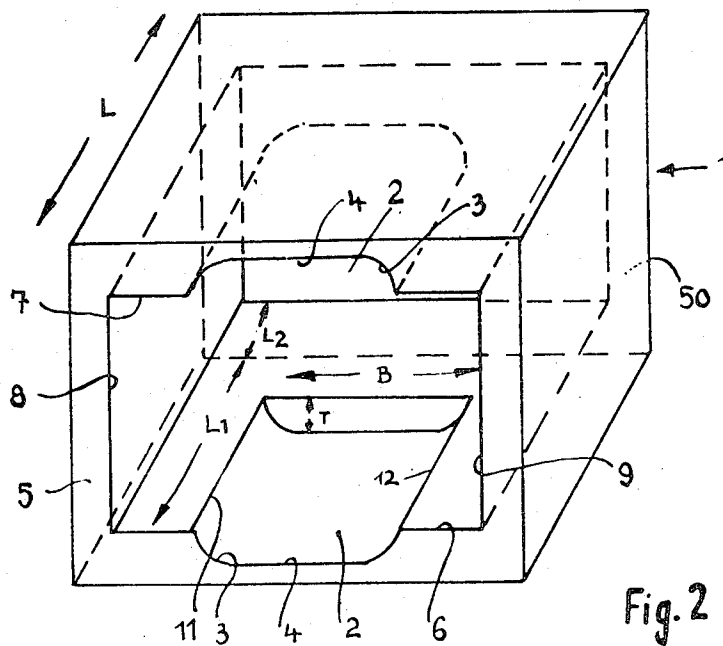


Fig. 2

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WAVEGUIDE TRANSITION

The present invention relates to transition transformation parts adapted to lead from a preferably oval waveguide to a rectangular cross-section, the oval waveguide preferably being made smooth or corrugated.

In accordance with the invention there is the provision that in the transition transformation part a two-stage transformation occurs, a metal part having the overall length of those transformation stages having a parallel rectangular cross-section made by broaching extending through it, and for producing the second transformation stage from the side of the oval waveguide the broad sides of the rectangle are enlarged, preferably by meaning out, to the depth of this first transformation stage.

In accordance with a preferred form of the invention the milling out is carried out by means of a finger milling cutter so that the corners of the milled out part are rounded or filleted in accordance with the milling cutter radius. In accordance with a further preferred form of the invention there is the provision that the milled out portion runs over the whole breadth of the waveguide or only a part of the waveguide.

In accordance with a further preferred form of the invention there is the provision that the rectangular cross-section at the outlet end or side of the transition transformation part does not correspond to the rectangular cross-section of the waveguide which is adjacent and instead this connecting zone is employed as a further transformation stage.

Further preferred forms of the invention will be gathered more particularly from the subclaims.

In what follows an embodiment of the invention is described; further advantages and details of the invention will be gathered from the drawing and/or the description.

FIG. 1 shows the first stage of manufacture of a transition transformation part in accordance with the invention, that is to say a metal part having the overall length of both transformation stages, with a parallel rectangular cross-section made by broaching.

FIG. 2 shows a second stage in the production of the transition transformation part in accordance with the invention.

In the case of the metal part shown in FIG. 1 a parallel rectangular cross-section has already been broached out as a first stage for producing the transition transformation part in accordance with the invention. Furthermore the metal part has the overall length of both transformation stages.

FIG. 2 shows the transition transformation part 1 in accordance with the invention in its finished condition after conclusion of the second manufacturing stage. In accordance with the invention the transformation part 1 operates in two stages and for producing the second transformation stage (which has the length L_2) the two broad sides 6, 7 of the broached rectangle are preferably increased in size by milling from the side of the waveguide to the depth of the first transformation stage (which has the length L_1).

Thus recessing out or milling out in each of the broad sides 6, 7 of the rectangle is denoted by the reference numeral 2. The length of the milled out part is denoted by L_1 , the breadth with B and the depth with T. Over the length L_2 there remain the broad sides 6, 7 of the

rectangle in their original condition as shown in FIG. 1. The overall length L of the transformation part 1 is represented by the sum of L_1 and L_2 .

The recessed parts 2 are preferably arranged centrally, that is to say there are lateral limiting edges 11, 12 at the same spacings from the narrow sides 8, 9 of the rectangle. Furthermore preferably the recessed out part 2 in the lower broad side 6 of the rectangle and the recess 2 not provided with a reference numeral in the upper broad side 7 of the rectangle have the same shape. Furthermore the two recessed out parts 2 in the upper and lower broad sides 6, 7 are arranged so as to be symmetrical about a plane between them.

In accordance with the invention the recessed out parts 2 preferably have filleted corners 3, which extend along the whole length L_1 . The bottom edge 4 of each recessed out part 2 preferably runs in a straight line parallel to the broad sides 6 and 7 respectively. The recessed out parts 2 can extend over a part (see FIG. 2) of the broad side 6, 7; it is also possible, however, for the recessed out parts 2 to extend over the whole broad side 6, 7.

In accordance with the invention the recessed out parts 2 are preferably produced by milling a finger milling cutter so that the rounded edges 3 are produced automatically in accordance with the radius of the milling cutter.

The oval waveguide not shown in the drawing lies at the inlet end 5 of the transition transformation part 1. The rectangular cross-section at the outlet end of the waveguide component or of the transition transformation part 1 does not, preferably, correspond with the rectangular cross-section of the following waveguide. Instead this connecting part is constructed as a further transformation stage.

Owing to the measures of the present invention a very simple production of the transition transformation part is ensured, and the transformation part has a highly satisfactorily transformation behavior.

What we claim is:

1. A transition transformation part for coupling an annular shaped smooth or corrugated waveguide to a rectangular cross-section waveguide characterized in that said part comprises a metallic member having a through opening of constant rectangular cross-section; said member having a first transformation stage provided in two parallel surfaces of said rectangular opening, said first transformation stage comprising a recess in each of said parallel surfaces; the cross-section of each recess being substantially rectangular shaped and having arcuate corners where the sides of each recess meets the base thereof; each of said recesses being of constant cross-section along their length.

2. A transformation part in accordance with claim 1 characterized in that said recesses extend over a portion of the length of said opening.

3. A transformation part in accordance with claim 1 characterized in that the breadth of said recesses is less than the width of the broad sides in which the recesses are formed.

4. A transformation part in accordance with claim 1 characterized in that the breadth of each of said recesses is equal to the width of the side in which the recesses are formed.

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5. A transformation part in accordance with claim 1 characterized in that said recesses are arranged so as to be symmetrical about a plane of symmetry positioned between said recesses.

6. A transformation part in accordance with claim 1 characterized in that the lateral limiting edges of said recesses are equally spaced from the remaining parallel sides of said rectangular opening.

7. A transformation part in accordance with claim 1 characterized in that the base portions of said recesses are parallel to the sides of the rectangular opening in which they are formed.

8. A transformation part in accordance with claim 1 characterized in that the arcuate transitions from the

bottom face to the sides of said rectangular opening in which said recesses are provided are formed by fillited corners.

9. A transformation part in accordance with claim 1 in that the breadth of said recesses coincide with the shape of the oval waveguide to which the first transformation is joined.

10. A transformation part in accordance with claim 1 characterized in that the rectangular cross-section of said rectangular opening has a perimeter different from the rectangular waveguide to which it is joined to serve as an additional transformation stage.

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