

[54] **WAVEGUIDE TRANSITION MEMBER**
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29/600

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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.

12 Claims, 3 Drawing Figures

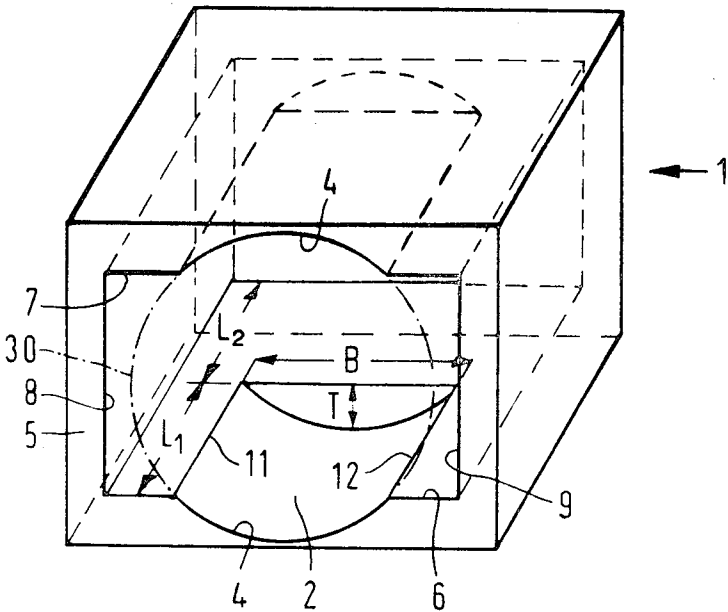


Fig. 1

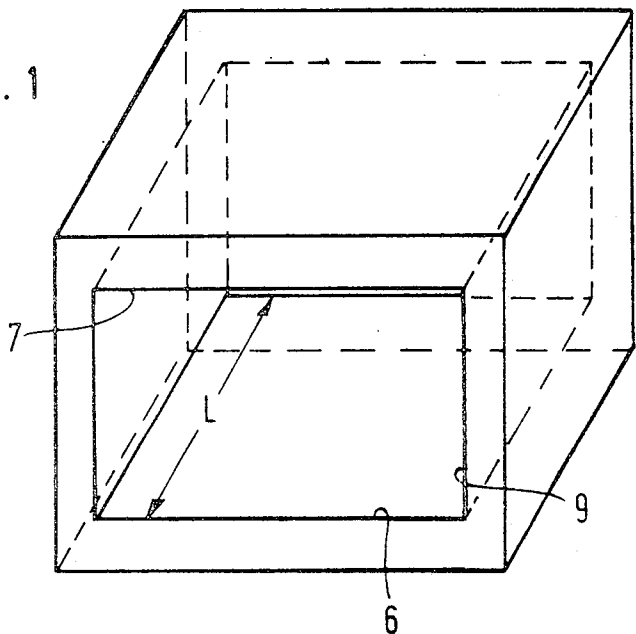
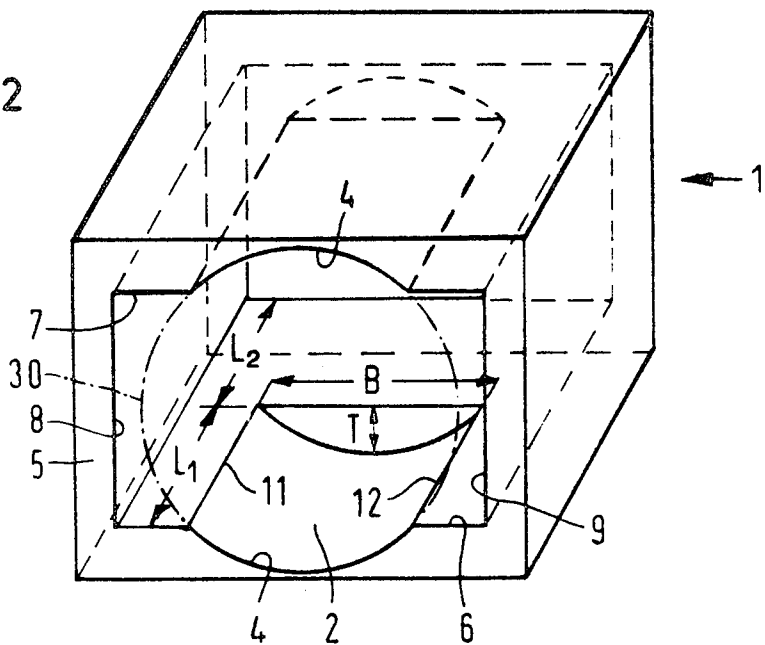


Fig. 2



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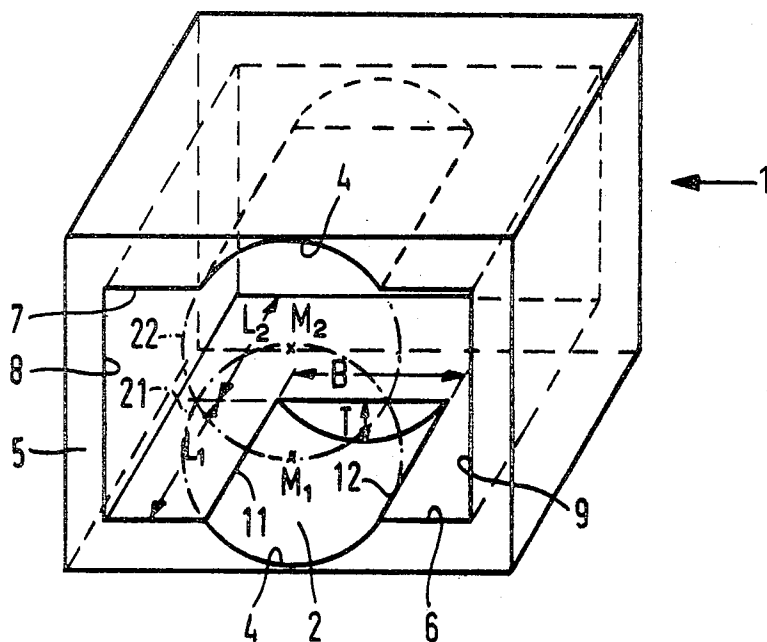


Fig. 3

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WAVEGUIDE TRANSITION MEMBER

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

In accordance with the invention there is the provision that in the transition transformation part a two stage transformation is present, a parallel rectangular cross-section being made, for instance by broaching, through a metal part having the overall length of both transformation stages while for producing the second transformation stage the broad sides of the rectangle are increased in size, preferably by turning on a lathe, for producing the second transformation stage from the side of the oval waveguide to the depth of this first transformation stage.

In accordance with a preferred form of the invention there is the provision that the bottom edge (or the cross-section of the bottom face) the recessed out parts in the broad sides of the first transformation stage are formed so as to be round, preferably arcuate. A preferred further development of the invention provides for the feature that both recessed out parts are limited by parts of one and the same cylindrical envelope. A further preferred form of the invention provides that the recessed out parts formed in a broad side of the waveguide is limited by a part of the envelope surface of a first circular cylinder and the recessed out part formed in the other broad side is limited by a part of the envelope surface of a second circular cylinder, both circular cylinders preferably having the same radius but having offset axes, which preferably lie in a plane parallel to the narrow sides of the rectangular waveguide.

In accordance with a further preferred feature of the invention there is the feature that the recessed out part extends over part only of the hollow waveguide.

In accordance with a further preferred form of the invention there is the provision that the rectangular cross-section of the outlet side of the transition transformation part does not correspond with the rectangular cross-section of the adjacent waveguide and instead this connection position is used as a further transformation stage.

An improvement of the band width and the reflexion factor can be achieved in accordance with a further development of the invention in the case of a transition transformation part in that the cylindrically constructed recessed out part is constructed in the axial direction with several stages decreasing in diameter. As a result a multistage transformation is achieved.

In accordance with a further feature of the invention the rear edge of one stage or each stage is made so as to be oblique, so that an improved transformation is achieved.

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 in production of the transition transformation part in accordance with the invention using a metal part, which extends over the

whole length of both transformation stages and has a parallel rectangular cross-section produced through it by broaching.

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

FIG. 3 shows a second embodiment of the invention.

The metal part shown in FIG. 1 has a parallel rectangular cross-section broached out through it as the first machining operation in the production of the transition transformation part in accordance with the invention. Furthermore the metal part has a length equal to the overall length of both transformation stages.

FIG. 2 shows a first embodiment of the invention and FIG. 3 shows a second embodiment of the invention in the form of a transition transformation part 1 in its finished condition after the conclusion of the second machining or manufacturing stage. In accordance with the invention the transformation part 1 operates in two stages and for production of the second transformation stage (which has a length L_2) the two broad sides 6, 7 of the broached through rectangle are increased in size, preferably by turning on a lathe, from the side of the oval waveguide to the depth of the first transformation stage, which possesses the length L_1 .

The recessed out part in each of the broad sides 6, 7 of the rectangle is denoted by the reference numeral 2. The length of the turned out part is denoted by L_1 , the breadth with B and the maximum depth by T. Along the length L_2 the broad side 6, 7 of the rectangle remain in their original condition as shown in FIG. 1. The overall length of the transformation side 1 is represented by the sum of L_1 and L_2 .

The recessed out parts 2 are preferably arranged centrally, that is to say their lateral limiting edges 11, 12 have the same distances from the narrow sides 8, 9 of the rectangle. Furthermore preferably the recessed out part 2 is constructed 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 is constructed with the same shape. Furthermore the two recessed out parts 2 in the upper and lower broad sides 6 are symmetrical about the plane lying between them.

In accordance with the invention the recessed out parts 2 have bottom faces and bottom edges 4 corresponding to the envelope surface of a circular cylinder along the whole length L_1 . The recessed out parts 2 can extend over a part (see FIGS. 2 and 3) of the broad side 6, 7; it is, however, also possible 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 made by turning on a lathe.

The embodiments of the invention in accordance with FIGS. 2 and 3 differ in that in one case (FIG. 2) the bottom faces 4 of the recessed out parts 2 are formed in the upper and lower broad side by one and the same circular cylinder, whose front end is denoted in broken lines in FIG. 2 and is indicated by reference numeral 30. In the case of the embodiment of the invention in accordance with FIG. 3 the recessed out part 2 formed in the lower broad side is formed by a circular cylinder 21 indicated in broken lines and the recessed out part 2 in the upper broad side 7 is formed by a cir-

cular cylinder 22 denoted by broken lines. The axes of the two circular cylinders are denoted by M_1 and M_2 respectively. The axes of the two circular cylinders lie in a plane parallel to the narrow side 8,9.

The oval waveguide not shown in the drawing is connected with the inlet end 5 of the transition transformation part 1. The rectangular cross-section at the outlet end of the fitting or transition transformation part 1 preferably does not correspond with the rectangular cross-section of the adjacent waveguide. Instead this connection position is used as a further transformation stage.

The measures in accordance with the invention provide for a very simple production of the transition transformation part so that the latter has a highly satisfactory transformation behavior.

What I claim is:

1. A transition transformation member for coupling a preferably oval smooth or corrugated waveguide to a rectangular cross-section waveguide characterized in that said member comprises a metallic member having a through opening of rectangular cross-section, a portion of said opening having arcuate shaped recesses in at least two opposing surfaces of said rectangular opening, said curvatures being constant over their entire length for producing a transformation stage in said opposing sides.

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

3. A transformation part in accordance with claim 1 characterized in that the breadth of said recesses each have widths less than the width of their associated opposing surfaces.

4. 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 between them.

5. A transformation part in accordance with claim 1 characterized in that the lateral limiting edges of said recesses are equally spaced from the sides of the rectangle adjacent those containing said recesses.

6. A transformation part in accordance with claim 1 characterized in that curved surfaces of both of said recesses lie along an imaginary line defined by one and the same circular cylinder.

7. A transformation part in accordance with claim 1 in that the curved surfaces of said recesses each have the same radius of curvature.

8. A transformation part in accordance with claim 1 characterized in that the curved surfaces of said recesses each have a different radius of curvature.

9. A transformation part in accordance with claim 1 characterized in that the rectangular cross-section of the outlet side of the transformation part does not correspond to the rectangular cross-section of the following waveguide, but instead is used as a further transformation stage.

10. A transformation part in accordance with claim 1 characterized in that the rectangular part forms the second transformation stage.

11. A transformation part in accordance with claim 1 characterized in that said cylindrical recesses each decrease in diameter in the axial direction in a number of stages.

12. A transformation part in accordance with claim 1 characterized in that the rear edge of one or each state is constructed obliquely.

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