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(54) BS converter

(57) A BS converter comprises a box-shaped housing (1) formed of a metallic material and incorporating a circuit board therein, with an electric circuitry being formed on said circuit board; a cylindrical waveguide portion (2) formed of a metallic material and connected at one end thereof to said housing; and a cylindrical horn

portion (3) formed of a metallic material and connected to the opposite end of said waveguide portion, wherein said housing, said waveguide portion and said horn portion are separately formed by deep drawing, said housing and said waveguide portion are connected to each other, and said waveguide portion and said horn portion are connected to each other.

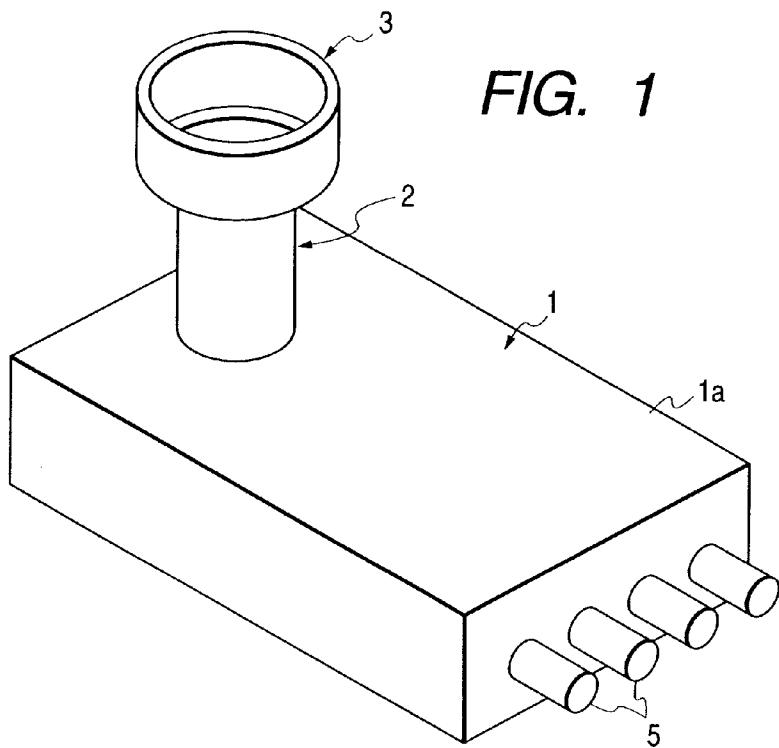


FIG. 1

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Description

[0001] The present invention relates to a BS (broadcasting satellite) converter disposed outdoors.

[0002] A conventional BS converter, as shown in FIGS. 6 and 7, has a box-shaped housing 21 incorporating a circuit board (not shown) therein, with an electric circuitry being formed on the circuit board, a cylindrical waveguide portion 22 connected to the housing 21, and a cylindrical horn portion 23 connected to the waveguide portion 22. The housing 21, the waveguide portion 22 and the horn portion 23 are formed integrally by die casting of an aluminum alloy.

[0003] As is seen from FIGS. 6 and 7, the housing 21 has a rectangular box shape, the waveguide portion 22 has a cylindrical shape of a relatively small diameter, and the horn portion 23 has a cylindrical shape of a large diameter. Thus, they are different in size and shape and together constitute an integral body.

[0004] A lid 24 constituted by a metallic plate is attached to a lower opening of the housing 21 to shield the interior of the housing. Further, coaxial connectors 25 are attached to the housing 21.

[0005] In such a BS converter, a satellite radio wave is inputted to the horn portion 23 and a signal resulting from an electrical processing in the electric circuitry on the circuit board is outputted through the connectors 25.

[0006] In the above conventional BS converter, since the housing 21, waveguide portion 22 and the horn portion 23 are integrally formed by die casting of an aluminum alloy, the amount of the material used is large and hence the cost of the material is high, besides, much time is required for the manufacture, thus giving rise to the problem that the productivity is poor and the cost is high.

[0007] Additionally, since the housing 21, waveguide portion 22 and horn portion 23 are different in size and shape, the die used for the die casting is complicated and expensive, thus giving rise to the problem that the converter is expensive.

[0008] According to the first means adopted by the present invention for solving the above-mentioned problems there is provided a BS converter comprising a box-shaped housing formed of a metallic material and incorporating a circuit board therein, with an electric circuitry being formed on the circuit board, a cylindrical waveguide portion formed of a metallic material and connected at one end thereof to the housing, and a cylindrical horn portion formed of a metallic material and connected to the opposite end of the waveguide portion, the housing, the waveguide portion and the horn portion being formed separately by deep drawing, the housing and the waveguide portion being joined to each other, and the waveguide portion and the horn portion being joined together.

[0009] According to an embodiment of the invention invention, the housing and the waveguide portion are joined together by caulking, and the waveguide portion

and the horn portion are joined together also by caulking.

[0010] According to an embodiment of the invention the housing and the waveguide portion are threadedly engaged with each other, and the waveguide portion and the horn portion are also threadedly engaged with each other.

[0011] According to an embodiment of the invention the housing and the waveguide portion are joined together by both caulking and threaded engagement, and the waveguide portion and the horn portion are jointed together also by both caulking and threaded engagement.

[0012] Embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

FIG. 1 is a perspective view of a BS converter according to an embodiment of the present invention;

FIG. 2 is a sectional view thereof;

FIG. 3 is a sectional view taken on line III-III in FIG. 2;

FIG. 4 is a sectional view taken on line IV-IV in FIG. 2;

FIG. 5 is a sectional view of a BS converter according to another embodiment of the present invention;

FIG. 6 is a perspective view of a conventional BS converter; and

FIG. 7 is a sectional view thereof.

[0013] BS converters embodying the present invention will be described hereinunder with reference to FIGS. 1 to 5. FIG. 1 is a perspective view of a BS converter according to an embodiment of the present invention, FIG. 2 is a sectional view thereof, FIG. 3 is a sectional view taken on line III-III in FIG. 2, FIG. 4 is a sectional view taken on line IV-IV in FIG. 2, and FIG. 5 is a sectional view of a BS converter according to another embodiment of the present invention.

[0014] As shown in FIGS. 1 to 4, the BS converter according to an embodiment of the present invention comprises a box-shaped housing 1 incorporating a circuit board (not shown) therein, with an electric circuitry being formed thereon, a cylindrical waveguide portion 2 connected to the housing 1, and a cylindrical horn portion 3 connected to the waveguide portion 2.

[0015] The housing 1, waveguide portion 2 and horn portion 3 are separately formed by deep drawing from a metallic material such as, for example, aluminum or iron.

[0016] In an upper surface plate 1a of the housing 1, which is rectangular, there are formed a plurality of holes 1b, and projections 2a are formed at one end of the waveguide portion 2, while a flange portion 2c having a plurality of holes 2b is formed at the opposite end of the waveguide portion 2. Further, on a lower surface plate 3a of the horn portion 3 are formed downwardly extending projections 3b.

[0017] The projections 2a of the waveguide portion 2 are inserted into the holes 1b of the housing 1 and their tips are then caulked to combine the housing 1 and the waveguide portion 2 together. Likewise, the projections 3b of the horn portion 3 are inserted into the holes 2b of the waveguide portion 2 and their tips are then caulked to combine the waveguide portion 2 and the horn portion 3 together.

[0018] As is apparent particularly from FIGS. 1 and 2, the housing 1 has a rectangular box shape, the waveguide portion 2 has a cylindrical shape of a relatively small diameter, and the horn portion 3 has a cylindrical shape of a large diameter. They are different in size and shape. By separating them into three portions of different shapes, it becomes possible to form each portion in a simple shape.

[0019] Further, a lid 4 constituted by a metallic plate is attached to a lower opening of the housing 1 to shield the interior of the housing 1, and coaxial connectors 5 are attached to the housing 1.

[0020] In the BS converter of the above construction, a satellite radio wave is inputted to the horn portion 3 and a signal resulting from an electrical processing in the electric circuitry on the circuit board is outputted through the connectors 5.

[0021] Referring now to FIG. 5, there is illustrated a BS converter according to another embodiment of the present invention, in which a housing 1, a waveguide portion 2 and a horn portion 3 are separately formed by deep drawing from a metallic material such as, for example, aluminum or iron as in the previous embodiment. An upper surface plate 1a of the housing 1 and a lower surface plate 3a of the horn portion 3 are each formed with an internally threaded portion, and externally threaded portions formed at both ends of the waveguide portion 2 are brought into threaded engagement with the internally threaded portions of the housing 1 and the horn portion 3 to combine the housing 1 and the waveguide portion 2 together and combine the waveguide portion 2 and the horn portion 3 together in threaded engagements indicated at 6.

[0022] As to the above caulked connection and threaded connection, there may be adopted any of various other modifications than those described in the above embodiments. For example, both connections may be combined such as the housing 1 and the waveguide portion 2 being connected by caulked and the waveguide portion 2 and the horn portion 3 being connected by threaded engagement.

[0023] In the BS converter of the present invention, since the housing 1, waveguide portion 2 and horn portion 3 are separately formed by deep drawing, the amount of material used is small and the manufacture of the converter can be done easily in a short time. Therefore, the converter can be provided in high productivity and that inexpensively.

[0024] Moreover, the three-component separation described above is advantageous in that each compo-

nent is simple in structure and hence deep drawing dies of simple structures are employable, thus resulting in the cost of the dies being much lower than in the prior art, thereby making it possible to reduce the cost of the converter.

[0025] Further, since the housing 1 and the waveguide portion 2, as well as the waveguide portion 2 and the horn portion 3, are respectively combined together by caulked, threaded engagement, or a combination of the two, the connection can be done in a simple manner and thus the converter is suitable for mass production and can be manufactured in high productivity.

15 Claims

1. A BS converter comprising:

20 a box-shaped housing formed of a metallic material and incorporating a circuit board therein, with an electric circuitry being formed on said circuit board;

25 a cylindrical waveguide portion formed of a metallic material and connected at one end thereof to said housing; and

a cylindrical horn portion formed of a metallic material and connected to the opposite end of said waveguide portion,

30 wherein said housing, said waveguide portion and said horn portion are separately formed by deep drawing, said housing and said waveguide portion are connected to each other, and said waveguide portion and said horn portion are connected to each other.

35 2. A BS converter according to claim 1, wherein said housing and said waveguide portion are connected to each other by caulked, and said waveguide portion and said horn portion are connected to each other also by caulked.

40 3. A BS converter according to claim 1, wherein said housing and said waveguide portion are connected to each other by threaded engagement, and said waveguide portion and said horn portion are connected to each other also by threaded engagement.

45 4. A BS converter according to claim 1, wherein said housing and said waveguide portion are connected to each other by a combination of caulked and threaded engagement, and said waveguide portion and said horn portion are connected to each other also by a combination of caulked and threaded engagement.

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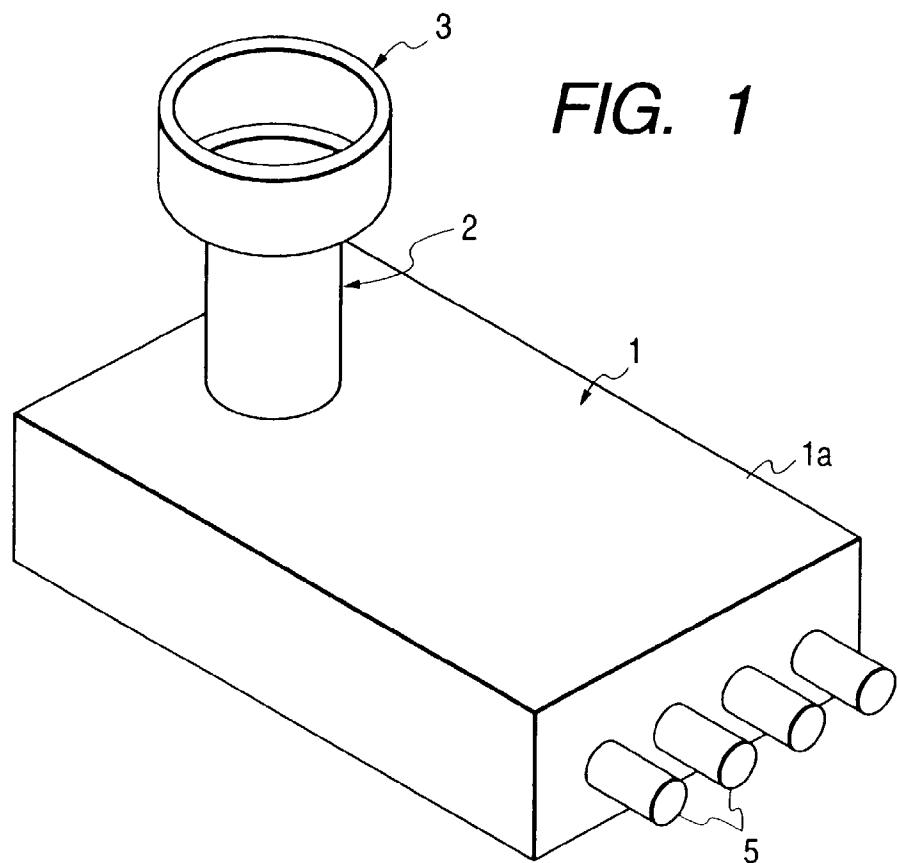


FIG. 2

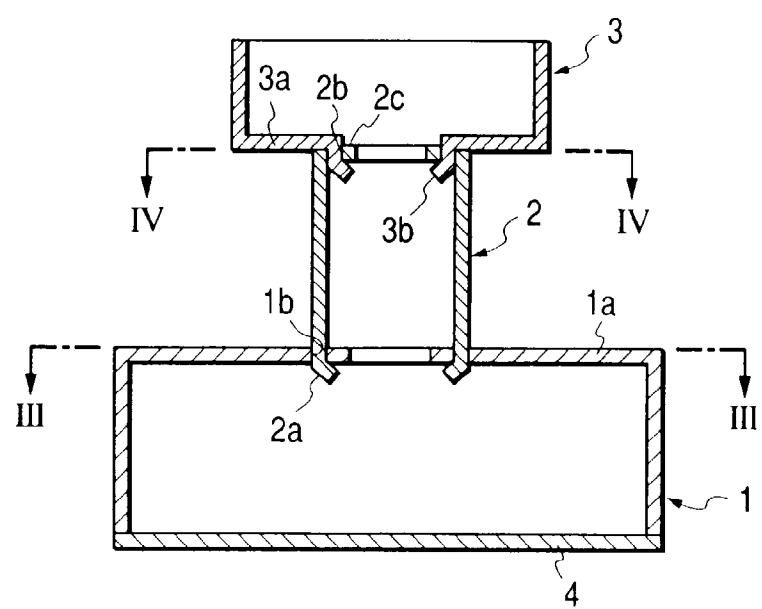


FIG. 3

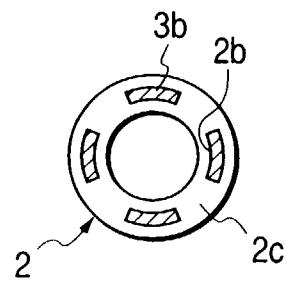


FIG. 4

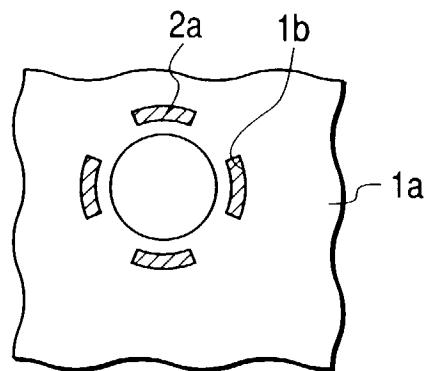


FIG. 5

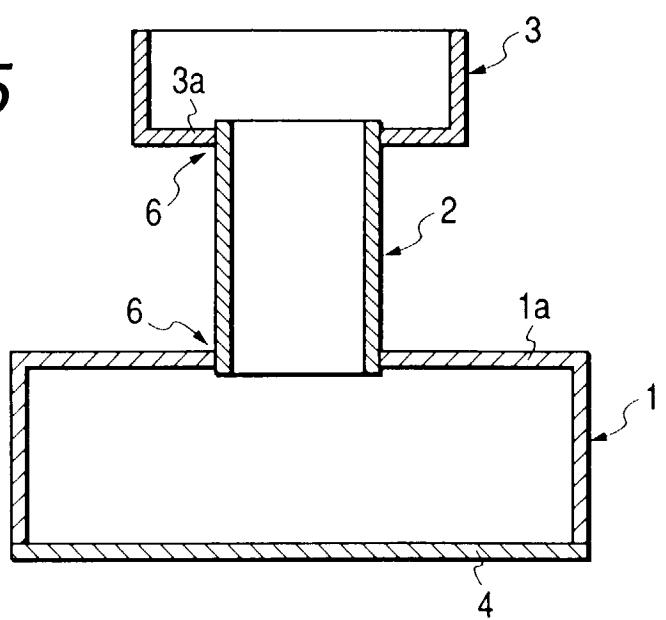


FIG. 6
PRIOR ART

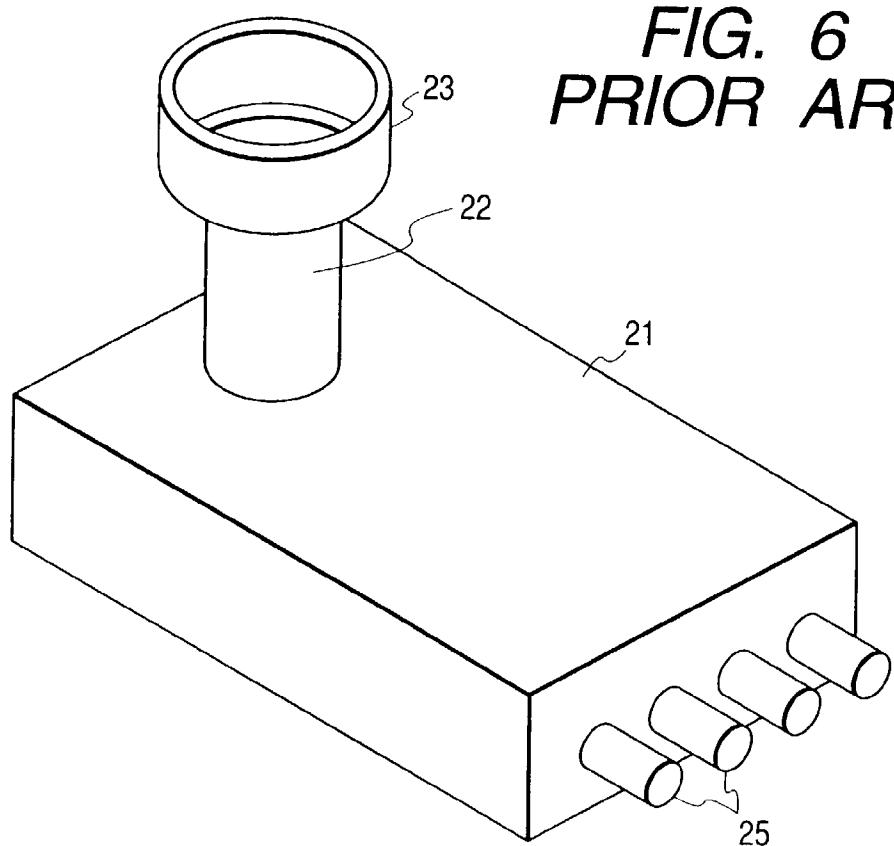


FIG. 7 PRIOR ART

