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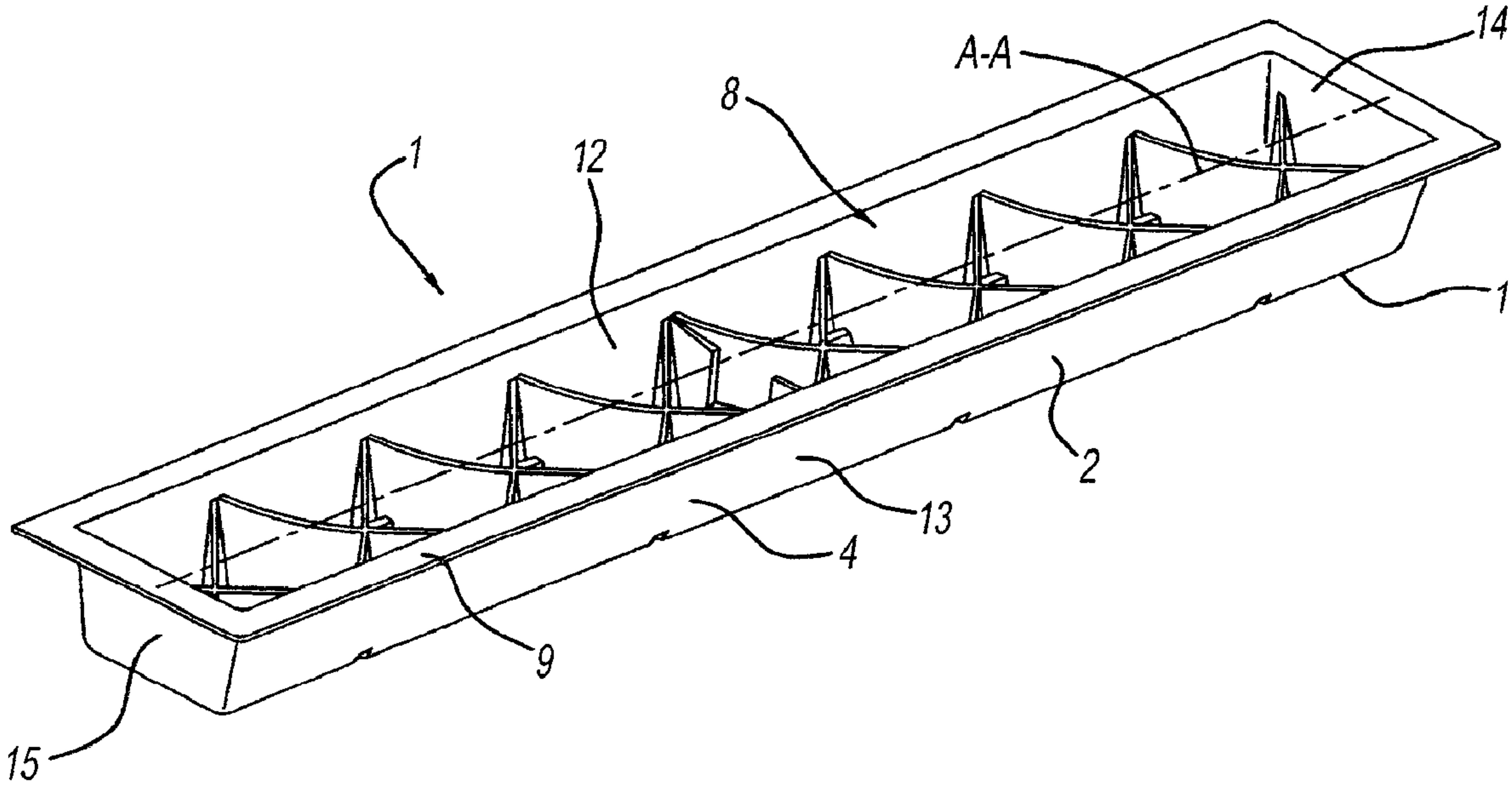
(54) **Titre : PIECE STRUCTURELLE**
(54) **Title: STRUCTURAL PART**



(57) **Abrégé/Abstract:**
A structural part, in particular a structural part designed as a transverse supporting member for connection between the A columns of a motor vehicle and, more in particular as a structural part in tailgates or bumper supporting members, is to be developed in such a way that it has low weight, high mechanical stability and rigidity and is simple and inexpensive to produce. To do this, the structural part (1, 1') is designed with a number of elongated closed or half-open synthetic material structures (2, 3), which in outer regions (4, 5) surround reinforcing filaments (6) running in the longitudinal direction (A) sectionwise, wherein the reinforcing filaments (6) are held form- lockingly in the respective synthetic material structure (2, 3) by means of formations (7) in their surface, so as to absorb tensile forces in bending of the structural part (1, 1').

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ABSTRACT

A structural part, in particular a structural part designed as a transverse supporting member for connection between the A columns of a motor vehicle and, more in particular as a structural part in tailgates or bumper supporting members, is to be developed in such a way that it has low weight, high mechanical stability and rigidity and is simple and inexpensive to produce. To do this, the structural part (1, 1') is designed with a number of elongated closed or half-open synthetic material structures (2, 3), which in outer regions (4, 5) surround reinforcing filaments (6) running in the longitudinal direction (A) sectionwise, wherein the reinforcing filaments (6) are held form-lockingly in the respective synthetic material structure (2, 3) by means of formations (7) in their surface, so as to absorb tensile forces in bending of the structural part (1, 1').

(Fig. 1)

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STRUCTURAL PART

[0001] The present invention relates to a structural part.

[0002] Structural parts of this kind may be used, for example, as supporting structures in motor vehicles, in particular as transverse supporting members in motor vehicles behind the instrument panel. A transverse supporting member of this kind in a motor vehicle serves to procure a connection between the A columns, on which the instrument panel, the air conditioner, the steering wheel-side steering column bearing, the airbag and other subassemblies may be suspended. For this purpose, the transverse supporting member must have high rigidity, so as to be able to resist the forces introduced from the steering column connection through the steering wheel.

[0003] Such transverse supporting members are well known from tubular steel constructions. However, these have very high weight, which is disadvantageous for fuel consumption. In further developments, transverse supporting members of a combination of metal and synthetic material have therefore been produced for the reduction of weight. EP 0,370,342 discloses such a transverse supporting member in hybrid construction. The latter has a dish-like basic element of metal, in the interior of which are arranged reinforcing ribs. These reinforcing ribs consist of injected synthetic material and are connected by the basic element to a plurality of apertures.

[0004] The object of the present invention is to further develop a structural part, in particular a structural part designed as a transverse supporting member for the

Description

connection between the A columns of a motor vehicle, in such a way that it has low weight, high mechanical stability and rigidity and is simple and inexpensive to produce.

[0005] The present invention accomplishes this object by a structural part having the features as provided in the claims.

[0006] The use of synthetic materials allows a distinct reduction in the total weight of the structural part to be obtained. By injection around and integration of the reinforcing filaments in the outer region of the structural part, high rigidity is still obtained. The embodiment according to the invention permits production at lower cost than in the case of structural parts that are made as stamped steel parts or tubular frame structures. Embedding of reinforcing filaments in the outer regions of the synthetic material structure results in improved crash behavior in the use of structural parts in motor vehicles.

[0007] When wires are used as reinforcing filaments, an inexpensive structural part can be produced by means of simple commercially available elements. For variously formed structural parts, the wires may be preformed in simple fashion.

[0008] Structural parts designed according to the invention may also be provided in tailgates, side doors or bumper supporting members as supporting structures, so as to absorb tensile forces in bending of the structural part.

[0009] Advantageous embodiments of the present invention are indicated in the dependent claims.

Description

[00010] The invention will be described below with reference to exemplary embodiments illustrated in the drawing, wherein:

Fig. 1 shows a structural part according to the invention in perspective representation in a half-open tub-like embodiment;

Fig. 2, an additional exemplary embodiment of a structural part in perspective representation with an elongated closed structure of synthetic material;

Fig. 3, the embodiment of Fig. 1 in a cut-open representation with reinforcing filaments exposed; and

Fig. 4 is an angled side perspective view of a vehicle instrument panel with the structural part located between the A columns.

[00011] Fig. 1 shows in an exploded view an embodiment of a structural part 1, which has an elongated dish-like basic element of a synthetic material. The longitudinal axis of the basic element is labeled A. The basic element has in cross section a substantially U-shaped structure and is limited by a floor surface 11, two elongated side surfaces 12, 13 and two end-side surfaces 14, 15 running transversely. The side surfaces 12, 13, 14, 15 of the basic element are bent over outward at right angles at the upper side edges and form a peripheral angled edge region 9. The basic element forms the outer regions 4 of the synthetic material structure. These reinforcing ribs 8 of synthetic material are located in the interior of the basic element between the side walls 12, 13, 14, 15. These reinforcing ribs 8 form an inner rib structure and starting from the side walls 12, 13 are arranged at an angle of between 30 and 60 degrees, preferably 45 degrees. In the exemplary embodiment illustrated in the drawing, the reinforcing ribs 8, starting from the side walls 12, 13 run at an angle of +/- 45 degrees. As shown, these reinforcing ribs 8 are arranged in such a way that they form a diamond-shaped grid in the interior of the basic element. So as to increase the stability of the synthetic material structure, reinforcing filaments 6, running in the longitudinal direction A, are embedded in the edge regions of the floor surface 11. These reinforcing filaments 6, in the exemplary embodiment shown, are designed as metal wires, which have formations 7 in their surface. These formations 7 may be holes, grooves or the like, arranged regularly spaced apart. In a preferred embodiment of the inventive idea, the reinforcing filaments 6 are made of metal, in particular steel, and have a coating for the prevention of corrosion. The steel wires preferably have a diameter of 3-4 mm. In an additional embodiment, the reinforcing filaments may alternatively be made as organoplates, metal strips, shaped metal parts or wire mesh.

[00012] In production of the structural part 1, 1', the reinforcing filaments 6 of metal are coated with synthetic material. Upon injection of the synthetic material into the corresponding formations 7 in the reinforcing filaments 6, the required form-lock between synthetic material and metal is obtained. In additional embodiments of the invention, the reinforcing filaments 6 may be arranged along the entire longitudinal extension of the structural part 1, 1', or alternatively be provided only sectionwise.

[00013] In production of the structural part, in a first step the reinforcing filaments 6, designed as wires, are placed, spaced apart parallel, in an injection mold. Then, the basic element with reinforcing ribs is coated, and thus the reinforcing filaments 6 are coated with the synthetic material compound. Connecting elements for the various subassemblies may likewise be formed directly onto the structural part in the injection molding method. Further details concerning the injection molding operation are omitted here, since they are well known to those skilled in the art. Thermoplastic composite materials, for example glass-, carbon-, or aramide fiber-reinforced thermoplastics such as, for example polypropylene, polyamide, polycarbonate, may be used as synthetic materials for the basic element with reinforcing ribs.

[00014] In additional embodiments, the basic element may have other designs in cross section and in length. The reinforcing filaments 6, formed as wires, may then be adapted to the corresponding shape of the basic element in simple fashion.

[00015] In the embodiment shown in Figure 3, two dish-like half-open structural parts 2, 3 are joined to make a closed structural part. The individual structural parts 2, 3 are identically constructed and correspond to the embodiment described for Figures 1 and 3. The two half-open structural parts are connected along their surrounding angled longitudinal and transverse edges 9. The connection at these seams may be made by cementing or welding. Owing to the connection of two half-open structural parts 2, 3, a structural part 1' with a closed cross section, which has still greater rigidity, can be obtained.

[00016] Referring now to Figures 2 and 4, the structural part 1′ is shown for supporting a vehicle instrument panel 100. The structural component 1′ is designed as a transverse supporting member for the connection between A columns 101 of a motor vehicle 102.

Claims

1. A structural part for supporting a vehicle instrument panel connected between A columns of a motor vehicle, comprising:

a number of elongated closed or half-open synthetic material structures of the structural part connected between A columns of the motor vehicle, wherein the elongated closed or half-open synthetic material structures have a half-open tub-like shape reinforced by at least one inner rib;

outer regions surrounding at least one metal wire extending parallel to a longitudinal axis of the structural part, wherein said at least one metal wire is arranged along the entire length of the structural part; and

formations on a surface of the at least one metal wire, wherein the formations create a form-lock between the at least one metal wire and the synthetic material structures to embed the at least one metal wire in the synthetic material structure, wherein the at least one metal wire is embedded in edge regions of a floor surface of the synthetic material structures so as to absorb tensile forces in bending of the structural part.

2. The structural part of claim 1, further comprising two half-open tub-like synthetic material structures joined by a joint, said two half-open tub-like synthetic material structures form a closed box structure.

3. The structural part of claim 2, wherein the joint is made by a cementing or welding connection along a surrounding flange surface.

4. The structural part according to any one of claims 1 to 3, wherein the at least one metal wire has a diameter of 3-4 mm.

5. The structural part according to any one of claims 1 to 4, wherein the synthetic material structures comprise thermoplastic composite materials.

6. The structural part according to claim 5, wherein the thermoplastic composite materials comprise at least one of glass-, carbon- and aramide fiber-reinforced thermoplastics.

7. The structural part according to claim 6, wherein the thermoplastic composite materials comprise at least one of polypropylene, polyamide, and polycarbonate.

8. A structural part for supporting a vehicle instrument panel connected between A columns of a motor vehicle comprising:

two half-open tub-like synthetic material structures each having an edge, wherein the two half-open tub-like synthetic material structures are joined together by said edge at a joint, said two half-open tub-like synthetic material structures form a closed box structure of the structural part connected between A columns of the motor vehicle;

outer regions of each said two half-open tub-like synthetic material structures surrounding at least one metal wire that extends parallel to a longitudinal axis of the structural part, wherein said at least one metal wire is arranged along an entire length of the structural part; and formations on a surface of the at least one metal wire, wherein the formations create a form-lock between the at least one metal wire and the one of said two half-open tub-like synthetic material structures to embed the at least one metal wire in each two half-open tub-like synthetic material structures, wherein the at least one metal wire is embedded in edge regions of a floor surface in each two half-open tub-like synthetic material structures so as to absorb tensile forces in bending of the structural part.

9. The structural part of claim 8, wherein each of said two half-open tub-like synthetic material structures has at least one inner rib.

10. The structural part of claim 8, wherein the joint is made by a cementing or welding connection along a surrounding flange surface.

11. The structural part of any one of claims 8 to 10, wherein the at least one metal wire has a diameter of 3-4 mm.

12. The structural part of any one of claims 8 to 11, wherein the synthetic material structures comprise thermoplastic composite materials.

13. The structural part of claim 12, wherein the thermoplastic composite materials comprise at least one of glass-, carbon-, and aramide fiber-reinforced thermoplastics.

14. The structural part of claim 13, wherein the thermoplastic composite materials comprise at least one of polypropylene, polyamide, and polycarbonate.

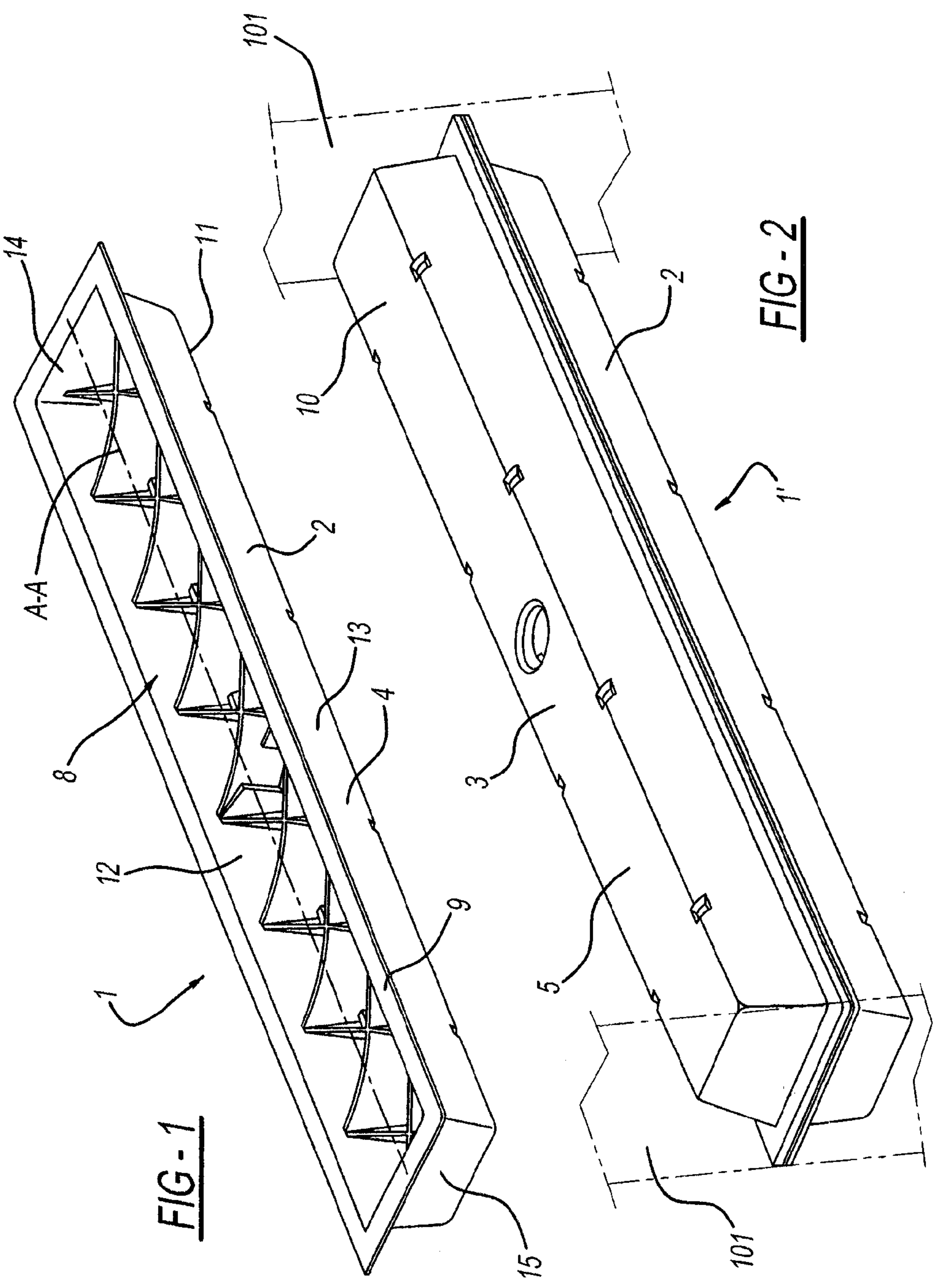


FIG - 1

FIG - 2

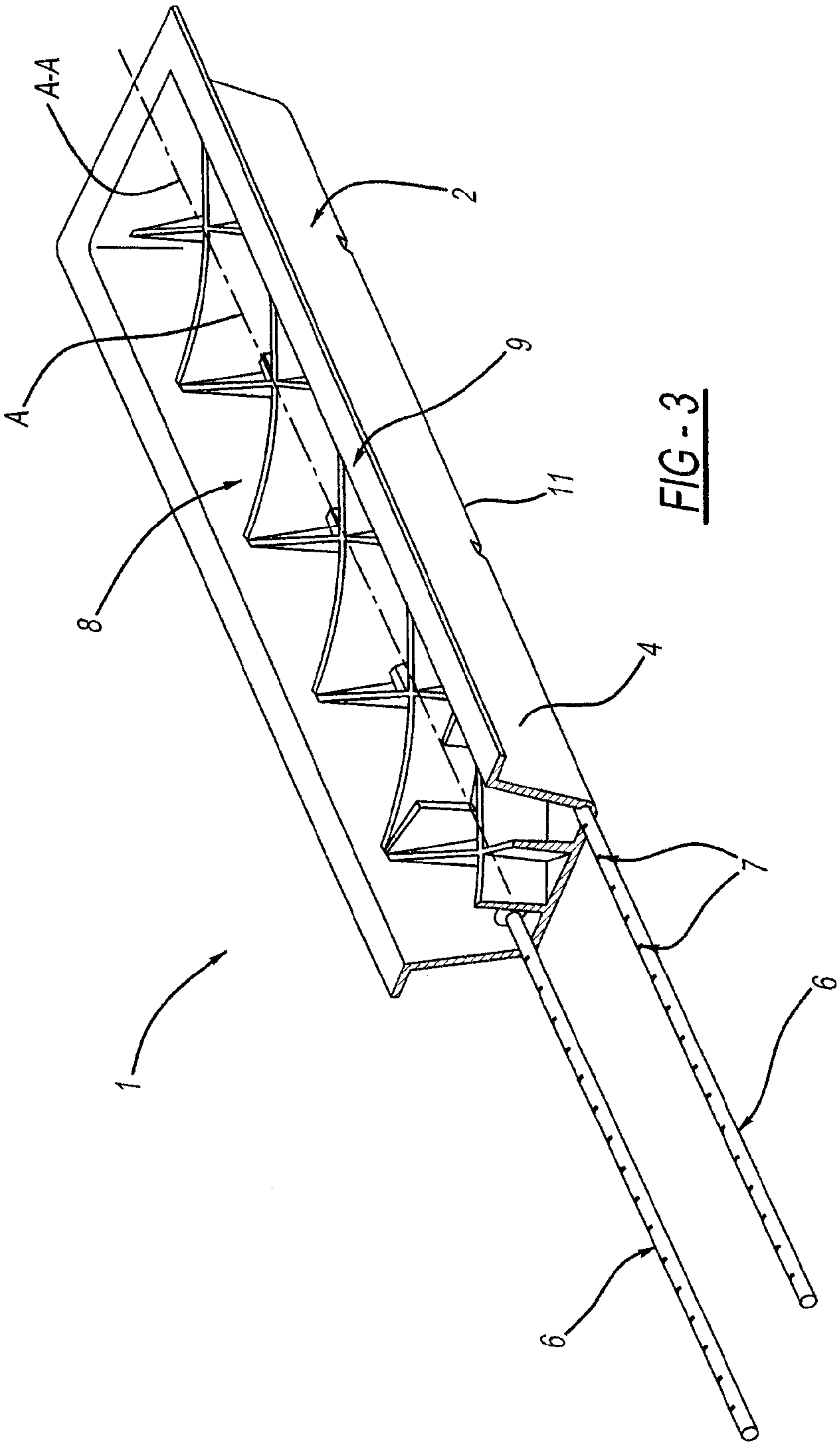


FIG - 3

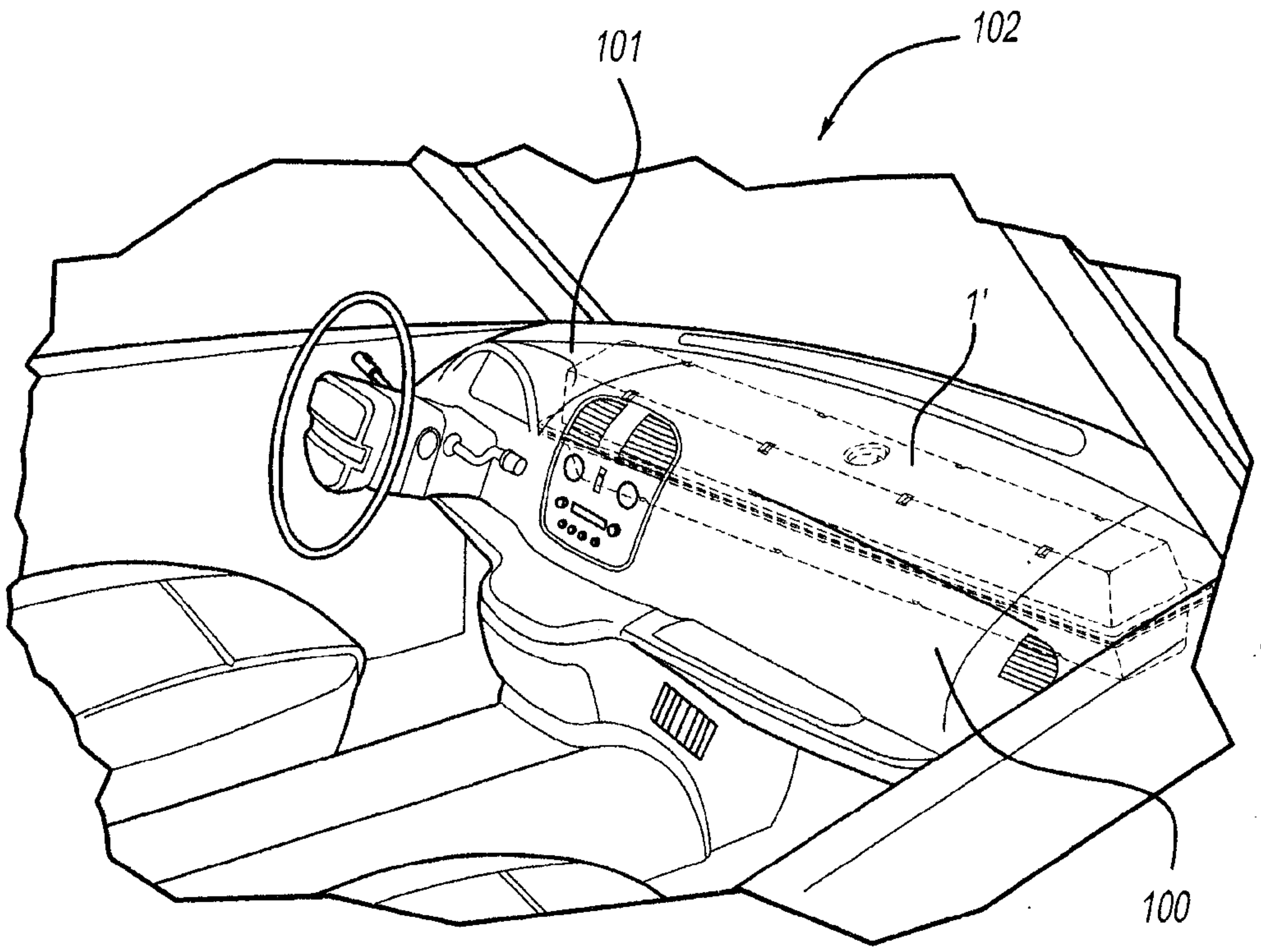
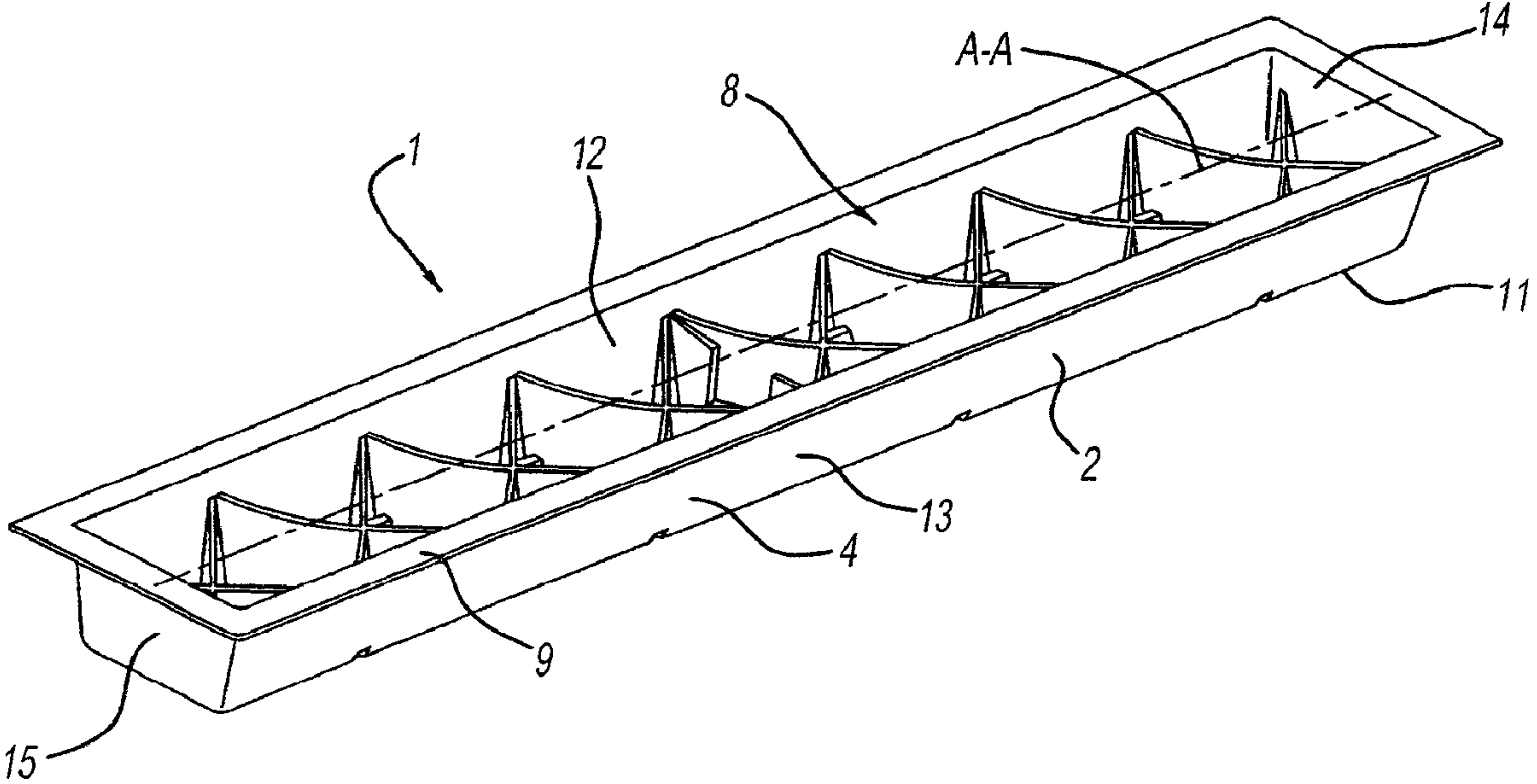


FIG - 4



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