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(54) **Modular stairway**

(57) A modular stairway (10) comprising a load-bearing structure (12) and a plurality of steps (14) fixed to the load-bearing structure (12), wherein the load-bearing structure (12) comprises a plurality of modular elements (16) fixed to one another, in which each modular element is tubular and substantially S-shaped with a first end sec-

tion (24) and a second end section (30) of a circular shape with respective axes (18a, 18b) parallel to one another, wherein at least one of said ends (24, 30) is fixed to a corresponding end (24, 30) of an adjacent modular element (16) by means of a spacer member (54) with adjustable length that defines the riser or the tread of the corresponding steps.

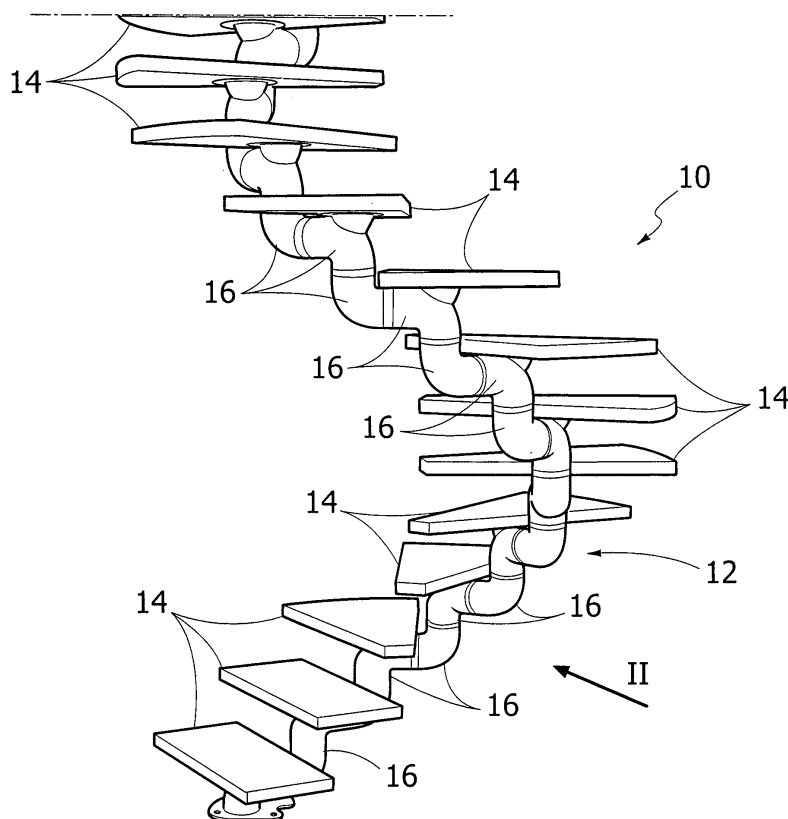


FIG. 1

Description

Background of the invention

[0001] The present invention relates to a modular stairway for providing a connection between premises set at different levels of a dwelling unit or the like.

[0002] Modular stairways existing on the market are made up of modules, the assembly of which gives rise to load-bearing structures that may be functional from the mechanical and technical standpoint but are far from satisfactory from the aesthetic point of view. The load-bearing structure of stairways of a known type strikes the eye as being in all cases an evident repetition of juxtaposed elements. The end result is a structure that frequently appears redundant and unattractive.

Summary of the invention

[0003] The object of the present invention is to provide a stairway with a load-bearing structure of a purely tubular and continuous shape, in which the fact that the structure is made up of the repeated assemblage of discrete elements is as imperceptible as possible.

[0004] A further object of the present invention is to provide a stairway in which, at the moment of assemblage, the adjustment of the distance between the steps can be performed in a simple and fast way.

[0005] According to the present invention, the above objects are achieved by a stairway in which the load-bearing structure comprises a plurality of modular elements fixed to one another, in which each modular element is tubular and substantially S-shaped, with a first end section and a second end section having a circular shape with respective axes parallel to one another, in which at least one of said end sections is fixed to a corresponding end section of an adjacent modular element by means of a spacer member with adjustable length, which defines the distance in a vertical direction or in a horizontal direction between two successive steps.

Brief description of the drawings

[0006] The present invention will now be described in detail with reference to the attached drawings, which are provided purely by way of non-limiting example and in which:

- Figure 1 is a perspective view illustrating an embodiment of a stairway according to the present invention;
- Figure 2 is a perspective view of a modular element designated by the arrow II in Figure 1;
- Figure 3 is an exploded perspective view of the modular element of Figure 2;
- Figures 4 and 5 are perspective cross-sectional views of two modular elements of different length;
- Figures 6 and 7 are perspective views from different

angles of a spacer member used in the stairway according to the present invention;

- Figures 8A to 8D are side views illustrating the spacer member of Figures 6 and 7 in different positions;
- Figures 9A and 9B are cross sections illustrating two modules of a stairway according to the present invention with the spacer member in different positions; and
- Figure 10 is a cross section illustrating a different mode of mutual connection of the modular elements according to the present invention.

Description of the preferred embodiment

[0007] With reference to Figure 1, designated by 10 is a stairway for dwellings or the like, comprising a modular load-bearing structure 12, fixed to which are a plurality of steps 14. The load-bearing structure 12 is made up of a plurality of modular elements 16 fixed to one another in the way that will be described in what follows.

[0008] With reference to Figures 2 to 5, each modular element 16 has substantially the shape of a pipe with double elbow, with a longitudinal axis 18 that is substantially S-shaped. The end stretches of the longitudinal axis 18, designated by 18a and 18b, are parallel to one another.

[0009] Each modular element 16 comprises a first elbow-shaped tubular section 20 and a second elbow-shaped tubular section 22. The first elbow-shaped tubular section 20 has two ends 24, 26 with circular cross section having axes orthogonal to one another. The second tubular section 22 also has two ends 28, 30 with circular cross section with axes orthogonal to one another. The end 28 of the second tubular section 22 is inserted and fixed in the second end 26 of the first tubular section 20. The tubular sections 20, 22 are preferably made of sheet metal, and fixing between the ends 26 and 28 is preferably performed by welding. As is shown in Figure 3, each elbow-shaped tubular section 20, 22 can be made up, respectively, of a first pair of shells 32 and a second pair of shells 34, for example made of stamped sheet metal, which are fixed to one another by welding.

[0010] Each modular element 16 comprises two circular plates 36, 38 fixed, respectively, to the first elbow-shaped tubular section 20 and to the second elbow-shaped tubular section 22. The plates 36, 38 have respective holes 40, 42 sharing the respective axes 18a, 18b. The plates 36, 38 are fixed, for example by means of welding, in a position corresponding to the respective ends 24, 30. The plate 36 is displaced by a certain distance inwards with respect to the edge of the end 24, whilst the plate 38 is located in the immediate vicinity of the edge of the end 30. The hole 42 of the plate 38 is threaded or else is associated to a threaded nut, fixed, for example, on the internal face of the plate 38.

[0011] The elbow-shaped tubular section 20 of each modular element 16 has a through hole 44 on its curved surface, aligned to the hole 40 of the plate 36.

[0012] Each modular element 16 comprises a member for supporting a step 46 fixed on the curved surface of the first elbow-shaped tubular section 20. The member for supporting a step 46 has an annular flange 48 provided with holes 50 for fixing screws (not illustrated). The supporting member 46 is fixed, for example by means of welding, in a position corresponding to the hole 44 of the first elbow-shaped tubular section 20. The supporting member 46 has a through opening 52 aligned to the hole 44.

[0013] With reference to Figures 6 and 7, designated by 54 is a spacer member with adjustable length. The spacer member 54 comprises a first part 56 and a second part 58 complementary to one another. Both of the parts 56, 58 are preferably made of metal material, for example, aluminium or zama. The two parts 56, 58 are able to turn with respect to one another along a common longitudinal axis 60 thereof. The two parts 56, 58 are provided with step-like resting surfaces 62, 64 complementary to one another. The resting surfaces 62, 64 extend along cylindrical sectors, for example, with angular extension of 120°. The two parts 56, 58 are able to assume relative positions angularly staggered with respect to one another. According to the relative angular position between the elements 56, 58, the number of steps of the resting surfaces 62, 64 in mutual contact varies and, consequently, the length of the spacer member 54 in the direction of the axis 60 varies. The parts 56, 58 of the spacer member 54 are provided with respective holes 66, 68 aligned to one another and sharing the axis 60. Figures 8A, 8B, 8C, 8D show one and the same spacer member 54 with the parts 56, 58 in different relative angular positions, corresponding to which are different effective lengths L1, L2, L3, L4 of the spacer member 54.

[0014] Figures 9A and 9B illustrate the way in which the modular elements 16 are fixed to one another in order to make up the modular load-bearing structure 12 of the stairway according to the present invention. In the embodiment illustrated in Figures 9A and 9B, the modular elements 16 are arranged with the plates 36, 38 oriented horizontally. A spacer member 54 is set between the plate 36 of a modular element 16 overlying the plate 38 of an underlying modular element 16. The two modular elements 16 are fixed to one another by means of a screw 70 that extends through the aligned holes 40, 42 of the plates 36, 38 and through the holes 66, 68 of the spacer member 54. The screw 70 engages a nut 72 fixed on the bottom face of the plate 38. The screw 70 is activated by means of a spanner (not illustrated), which is inserted through the opening 52 of the fixing member 46 and through the hole 44 of the section 20 of the overlying modular element 16. Figures 9A and 9B illustrate the spacer member 54, in the position of maximum effective length L1 and in the position of minimum effective length L4, respectively. By varying the effective length of the spacer member 54, the riser of the steps varies from the maximum value H1 to the minimum value H4.

[0015] As is illustrated in Figure 1, the modular ele-

ments 16 can be assembled both in a rectilinear way (the first two steps at the bottom of the stairway illustrated in Figure 1) or else with a relative angle in such a way as to provide a helical load-bearing structure 12, as occurs for the steps from the third one onwards in the stairway illustrated in Figure 1. The circular section of the modular elements 16 enables rotation through any angle of one module with respect to the previous one.

[0016] With reference to Figures 4 and 5, with the modular elements according to the present invention it is possible to vary the tread of the steps by providing modules 16 with different distances between the axes 18a and 18b. It is possible to produce modules with different standard lengths. The variation of length of each module is obtained simply by welding to one another in different positions the sections 20, 22 of each modular element 16.

[0017] Figure 10 illustrates a variant in which the spacer members 54 are used for adjusting the tread instead of the riser of the steps. In this case, the modular elements 16 are arranged with the plates 36, 38 oriented vertically, and a spacer member 54 is set between the plates 36, 38. It is also possible to combine the solutions illustrated in Figures 9A, 9B and in Figure 10, envisaging two spacer members 54 for each modular element 16. In this way, the spacer members with vertical axis enable adjustment of the riser, and the spacer members with horizontal axis enable adjustment of the tread.

[0018] The modular elements according to the present invention enable a load-bearing structure to be obtained having an aesthetic continuity, characterized by a very essential profile. Unlike existing modular stairways, in the solution according to the present invention the fact that the load-bearing structure is constituted by repeated assemblage of discrete modular elements is almost imperceptible. The assemblage of the individual modular elements is simple and fast. The spacer members according to the present invention enable all the standard sizes of riser to be obtained with just two pieces that can be rotated with respect to one another in different positions.

Claims

1. A modular stairway (10) comprising a load-bearing structure (12) and a plurality of steps (14) fixed to the load-bearing structure (12), wherein the load-bearing structure (12) comprises a plurality of modular elements (16) fixed to one another, **characterized in that** each modular element is tubular and substantially S-shaped with a first end section (24) and a second end section (30) having a circular shape with respective axes (18a, 18b) parallel to one another, in which at least one of said ends (24, 30) is fixed to a corresponding end (24, 30) of an adjacent modular element (16) by means of a spacer member (54) with adjustable length that defines the riser or the tread of the corresponding steps.

2. The modular stairway according to Claim 1, **characterized in that** each modular element (16) comprises two elbow-shaped tubular sections (20, 22).

3. The modular stairway according to Claim 2, **characterized in that** each modular element (16) comprises a pair of circular plates (36, 38) fixed in a position corresponding to the ends (24, 30) of the respective elbow-shaped tubular sections (20, 22). 5

4. The modular stairway according to Claim 2, **characterized in that** each modular element (16) comprises a member for fixing a step (46) fixed to one of said elbow-shaped tubular sections (20, 22). 10

5. The modular stairway according to Claim 1, **characterized in that** each of said spacer members (54) comprises two portions (56, 58) provided with respective step-like resting surfaces (62, 64), said portions (56, 58) being able to turn with respect to one another for defining different effective lengths (L1 - L4) of the spacer member (54). 15 20

6. The modular stairway according to Claim 5, **characterized in that** said spacer member (54) is fixed between a plate (36) of a first elbow-shaped tubular section (20) of one modular element (16) and a plate (38) of a second elbow-shaped tubular section (22) of an adjacent modular element (16). 25 30

7. The modular stairway according to Claim 6, **characterized in that** fixing between adjacent modular elements (16) is performed by means of at least one screw (70) that extends through aligned holes (40, 42, 66, 68) of said plates (36, 38) and of said spacer member (54). 35

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FIG. 1

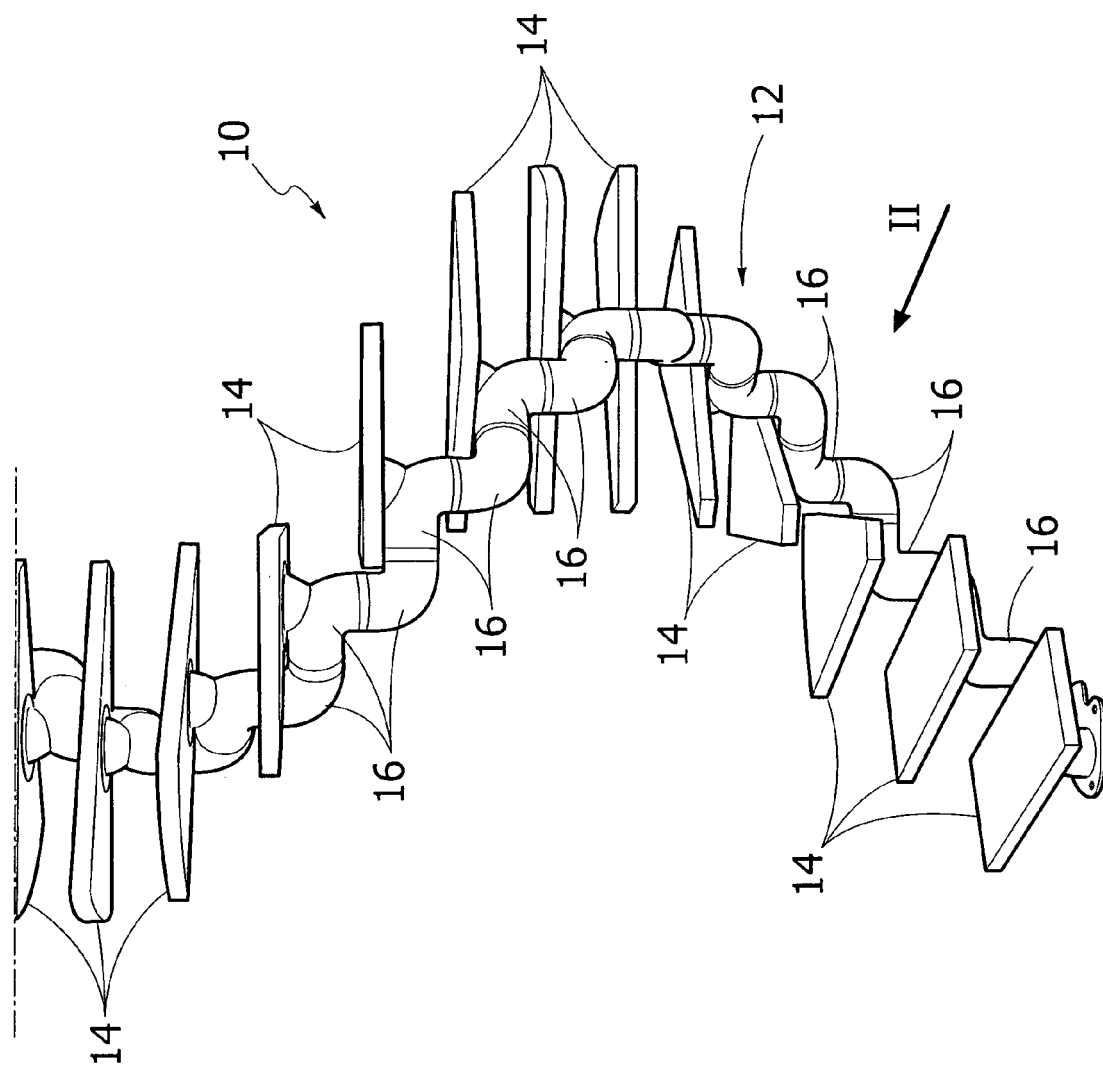
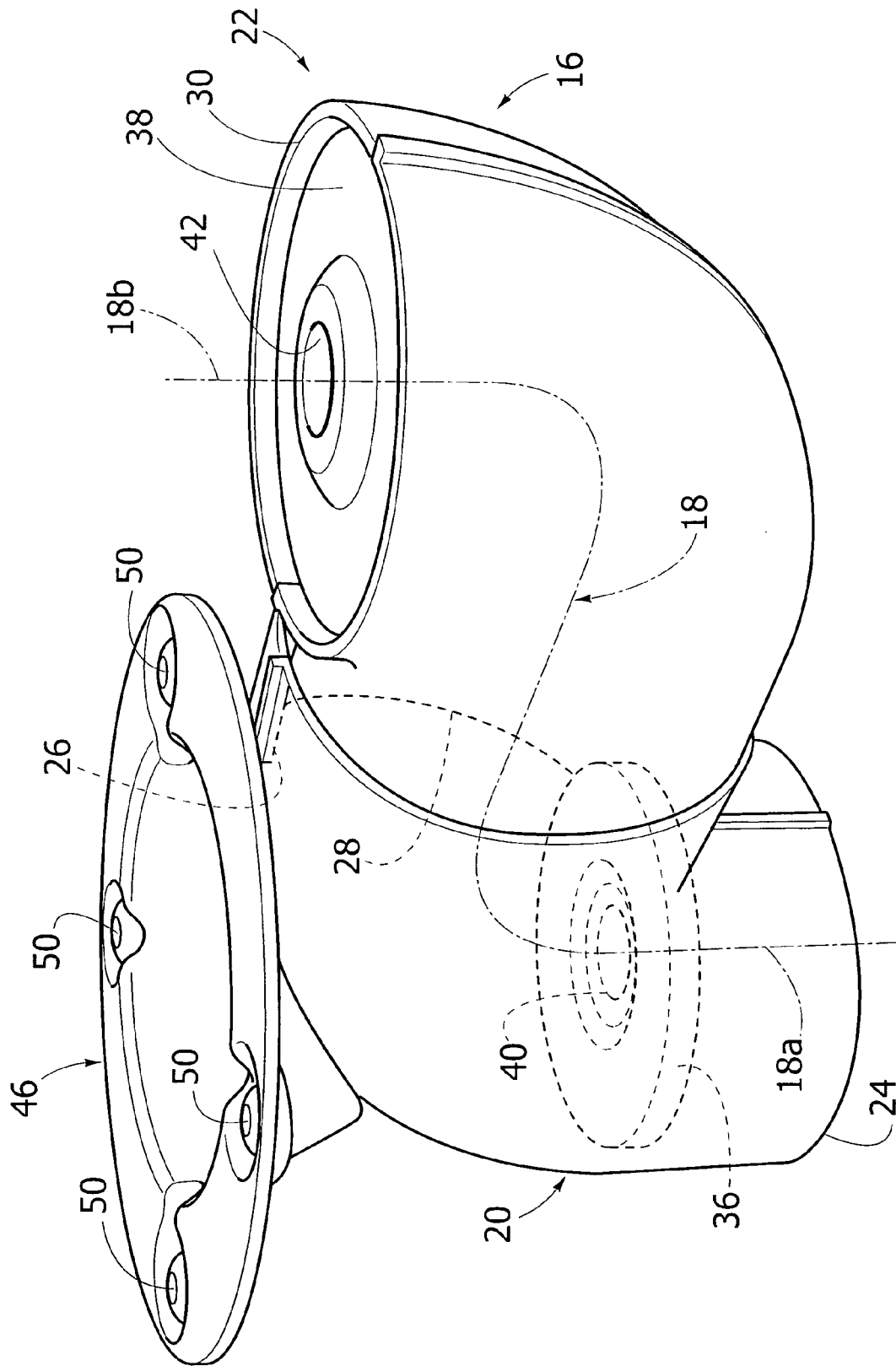


FIG. 2



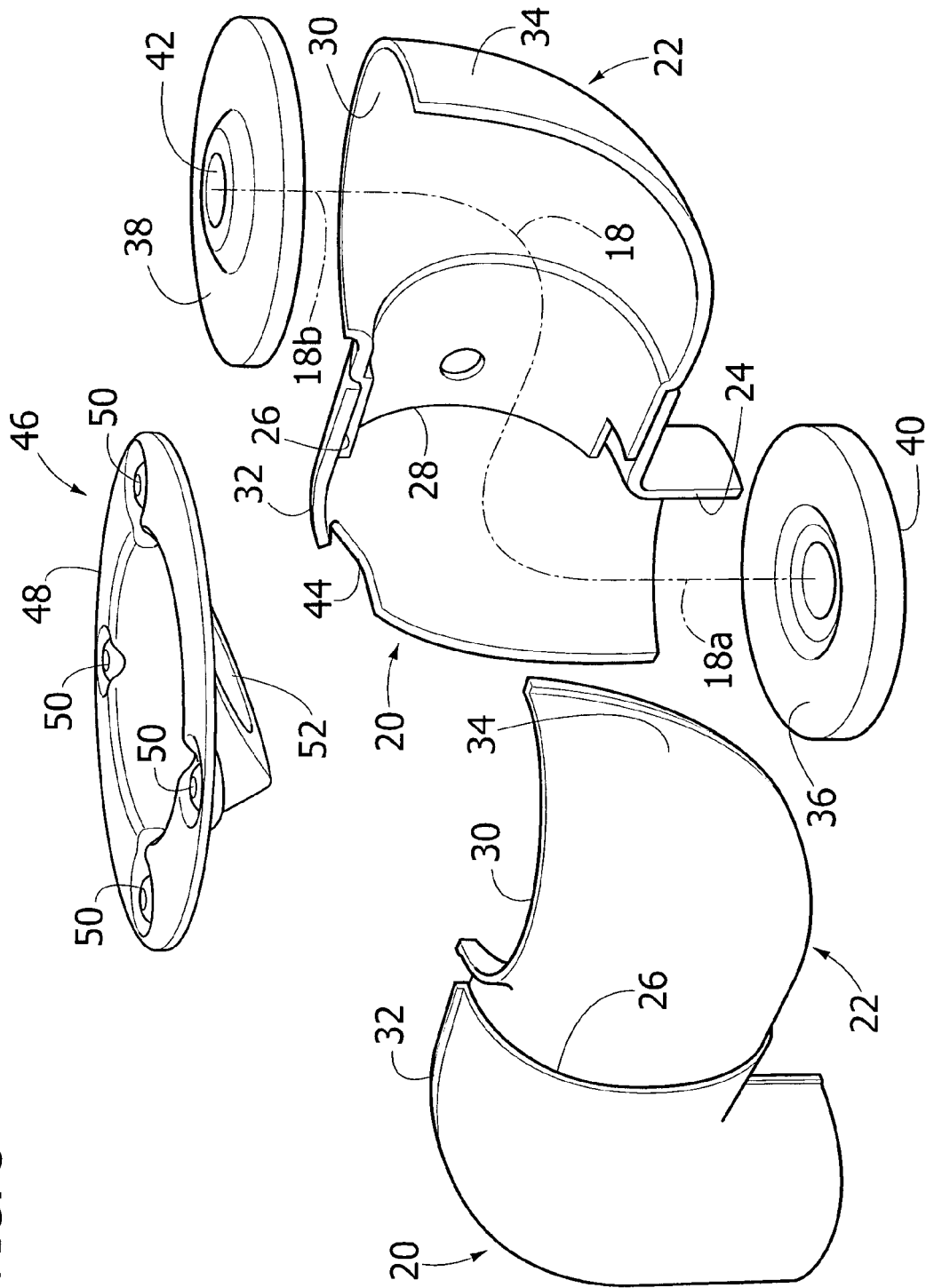


FIG. 3

FIG. 4

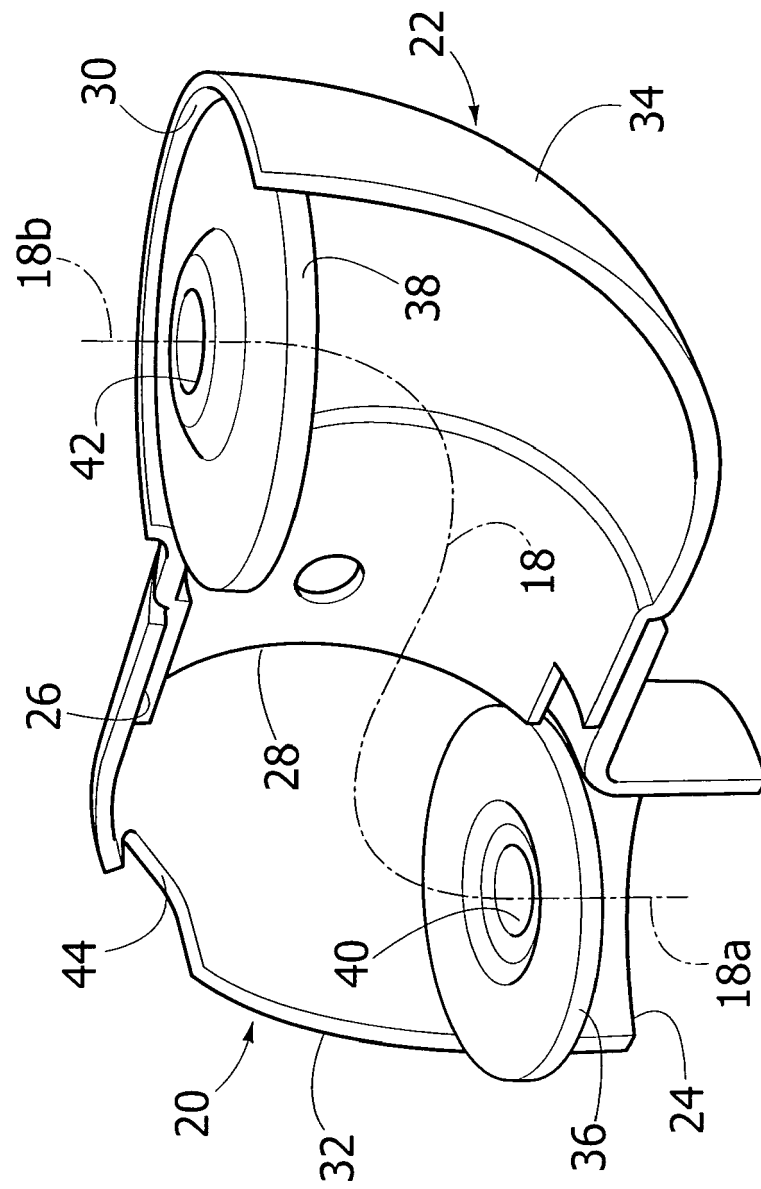


FIG. 5

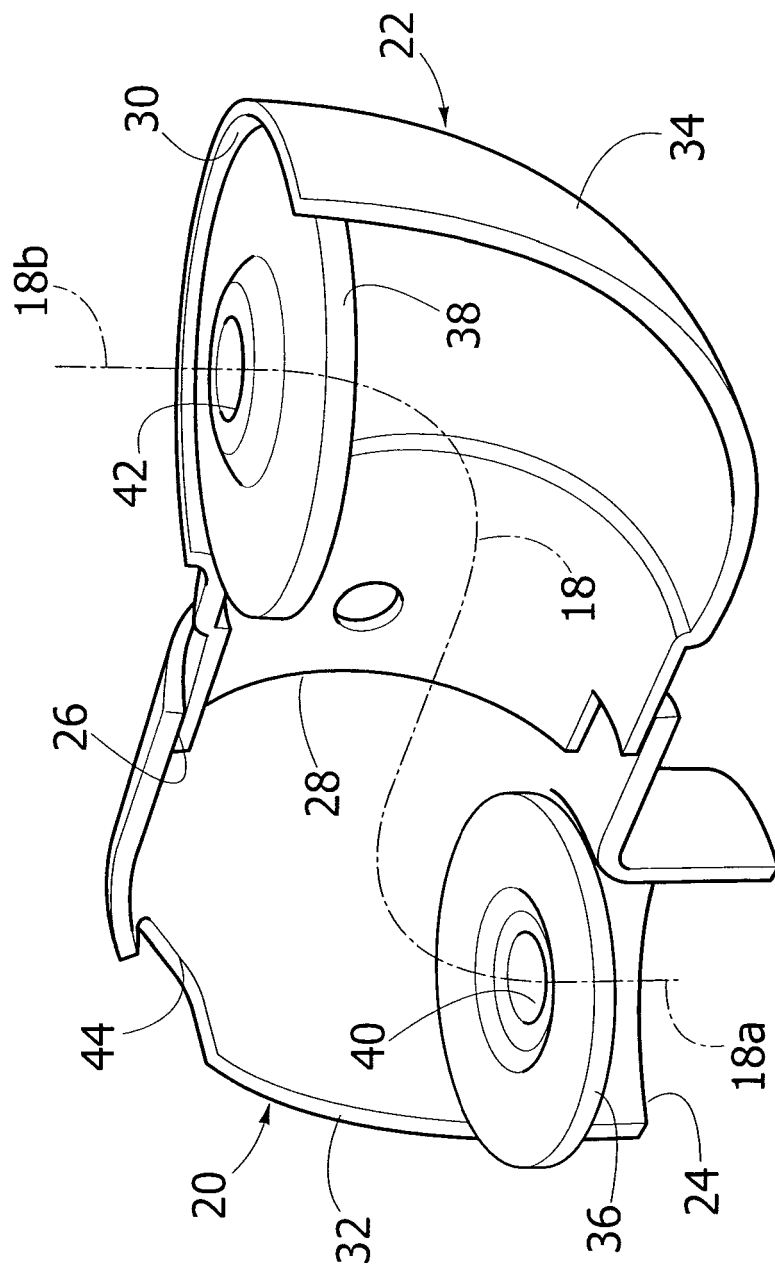


FIG. 6

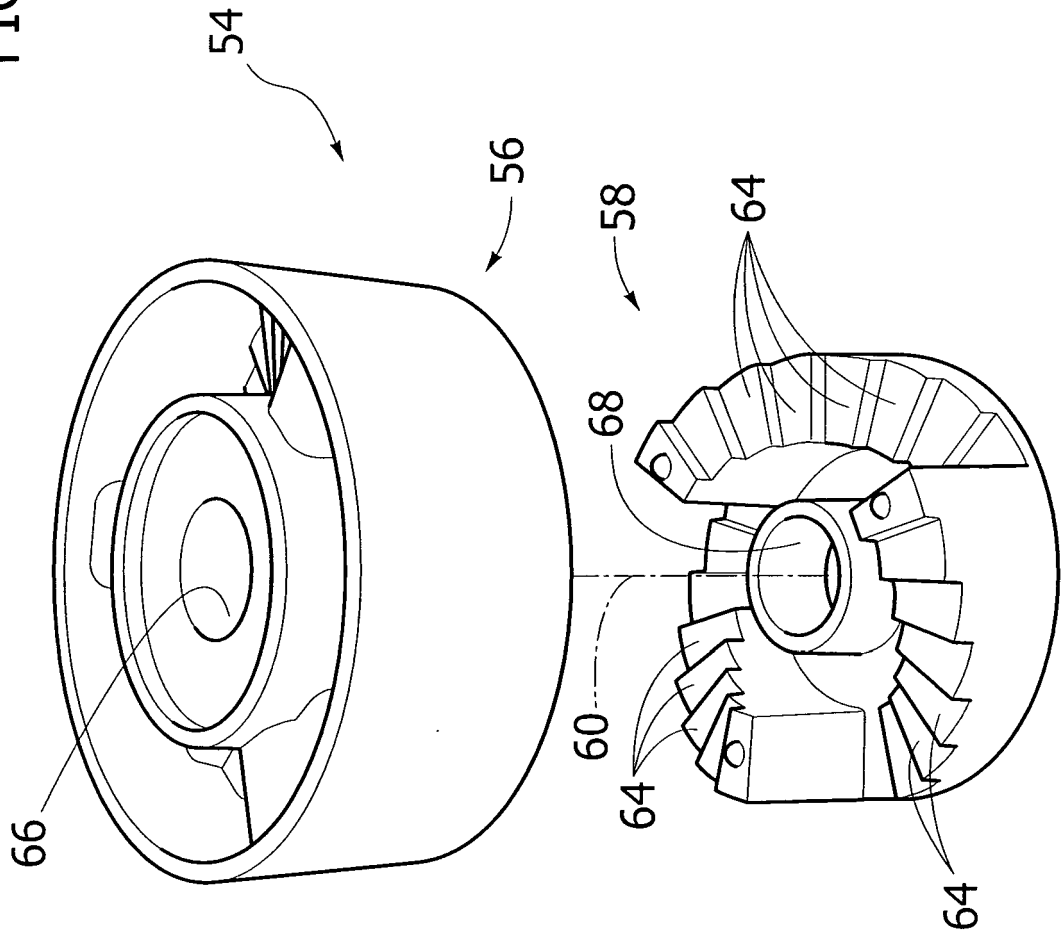


FIG. 7

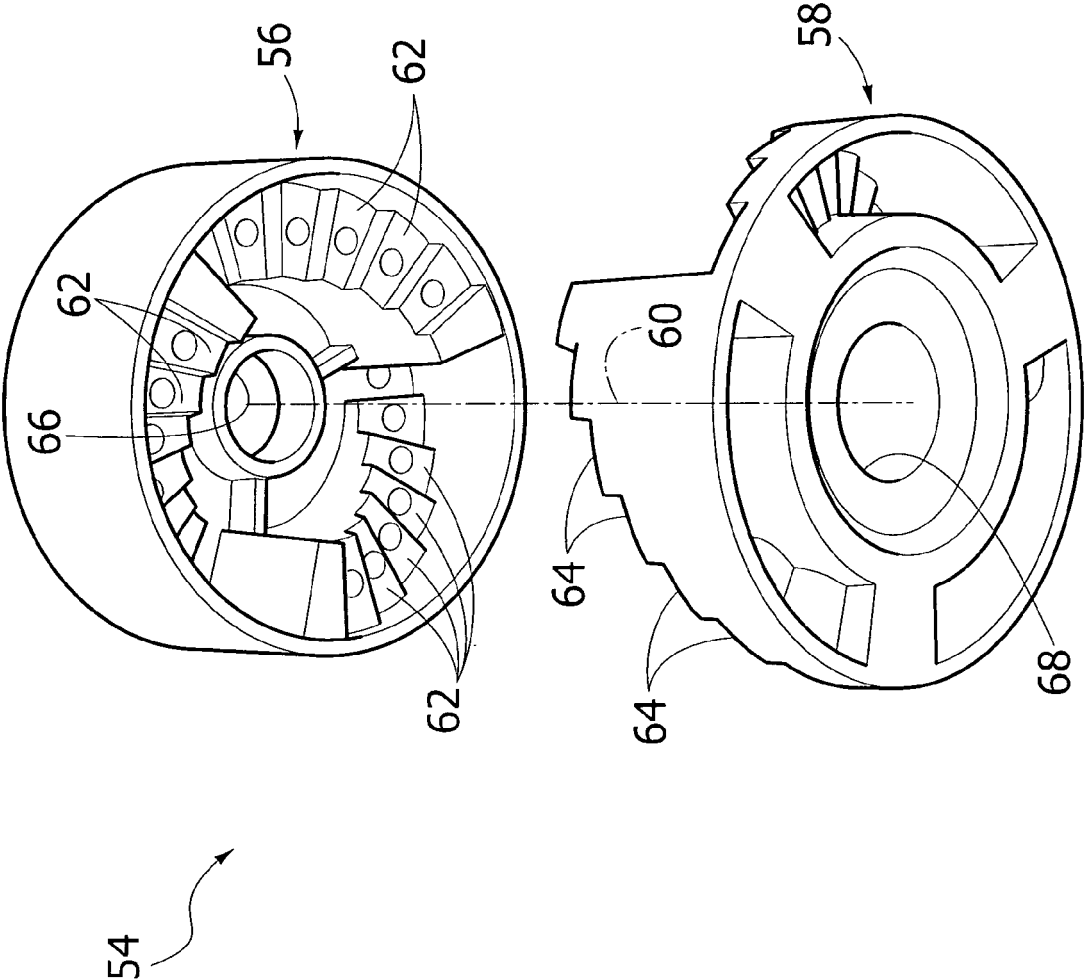


FIG. 8A

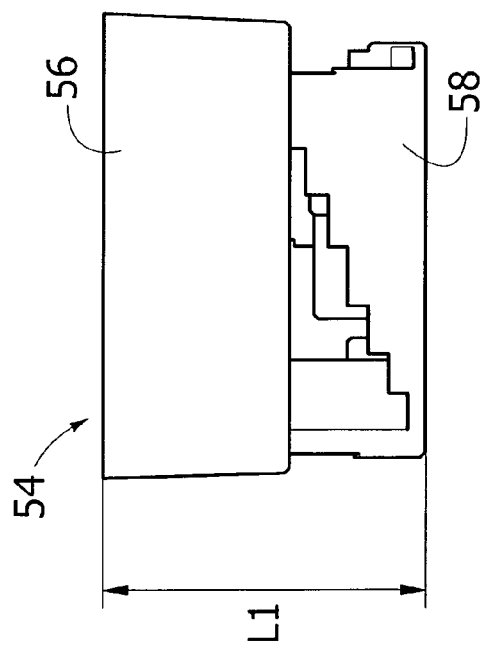


FIG. 8B

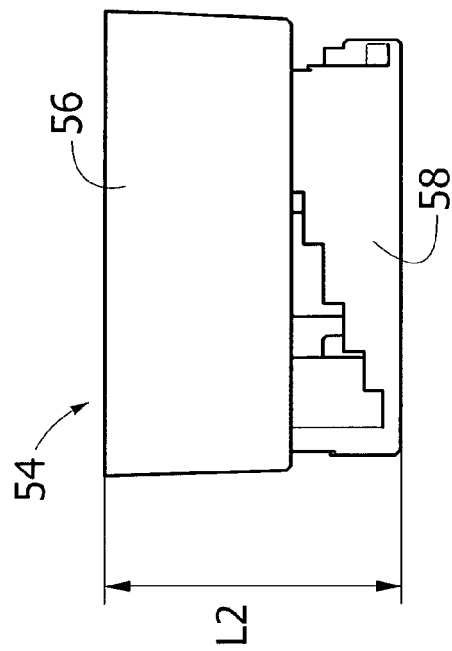


FIG. 8C

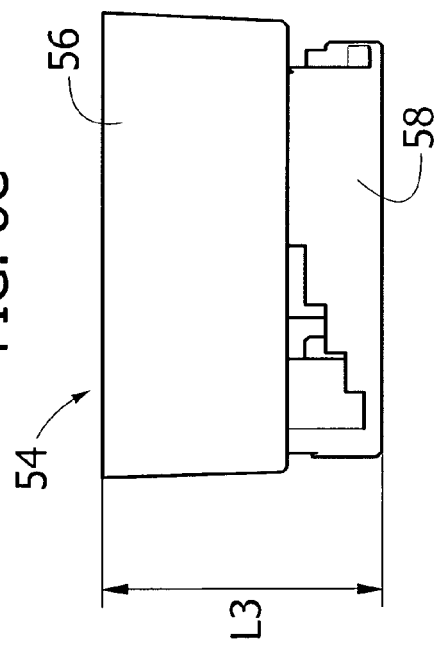


FIG. 8D

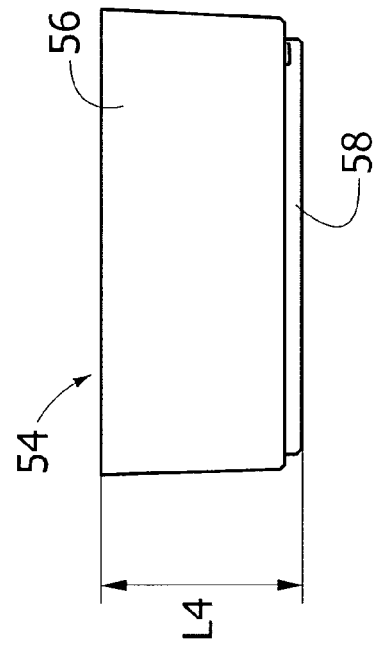


FIG. 9A

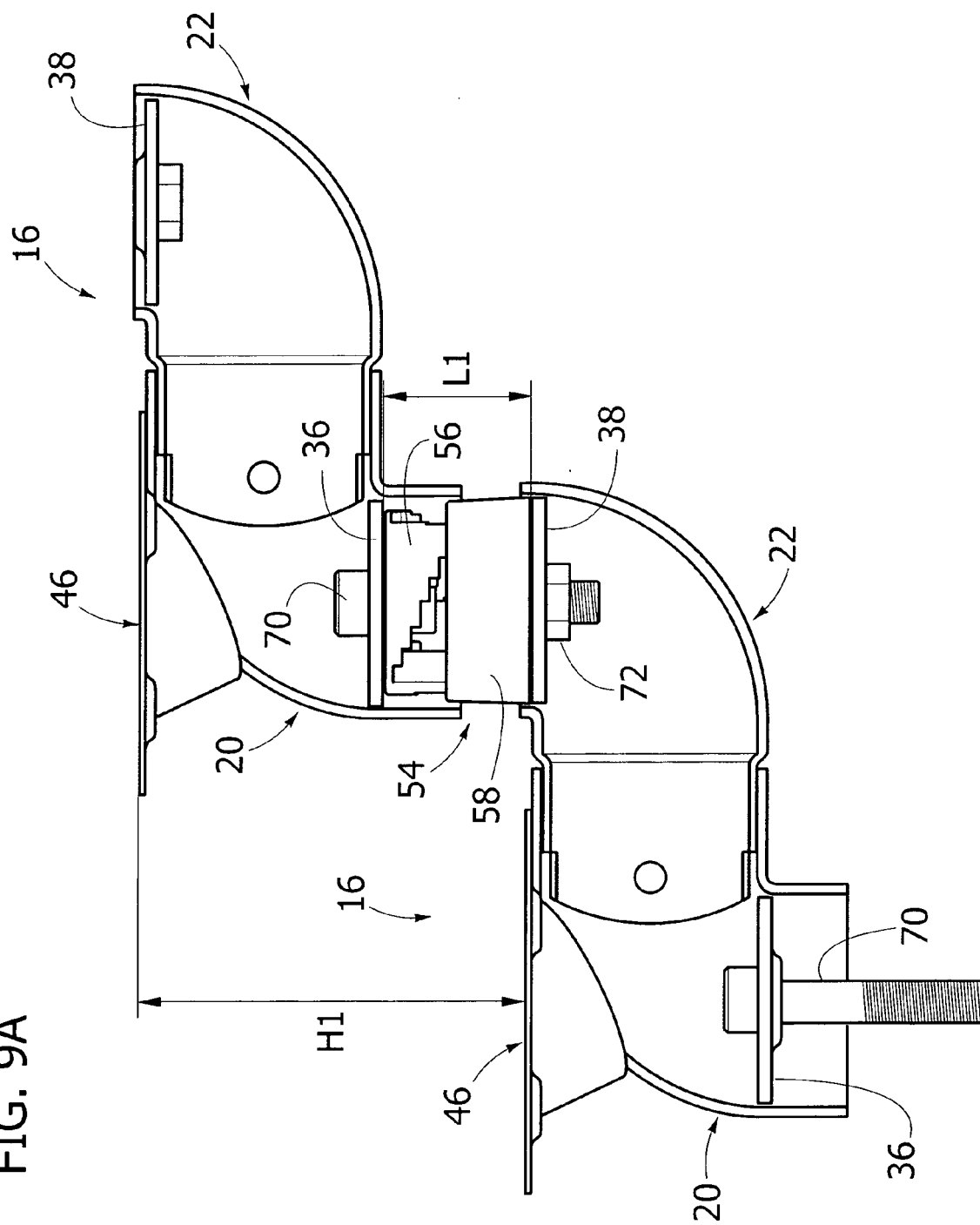
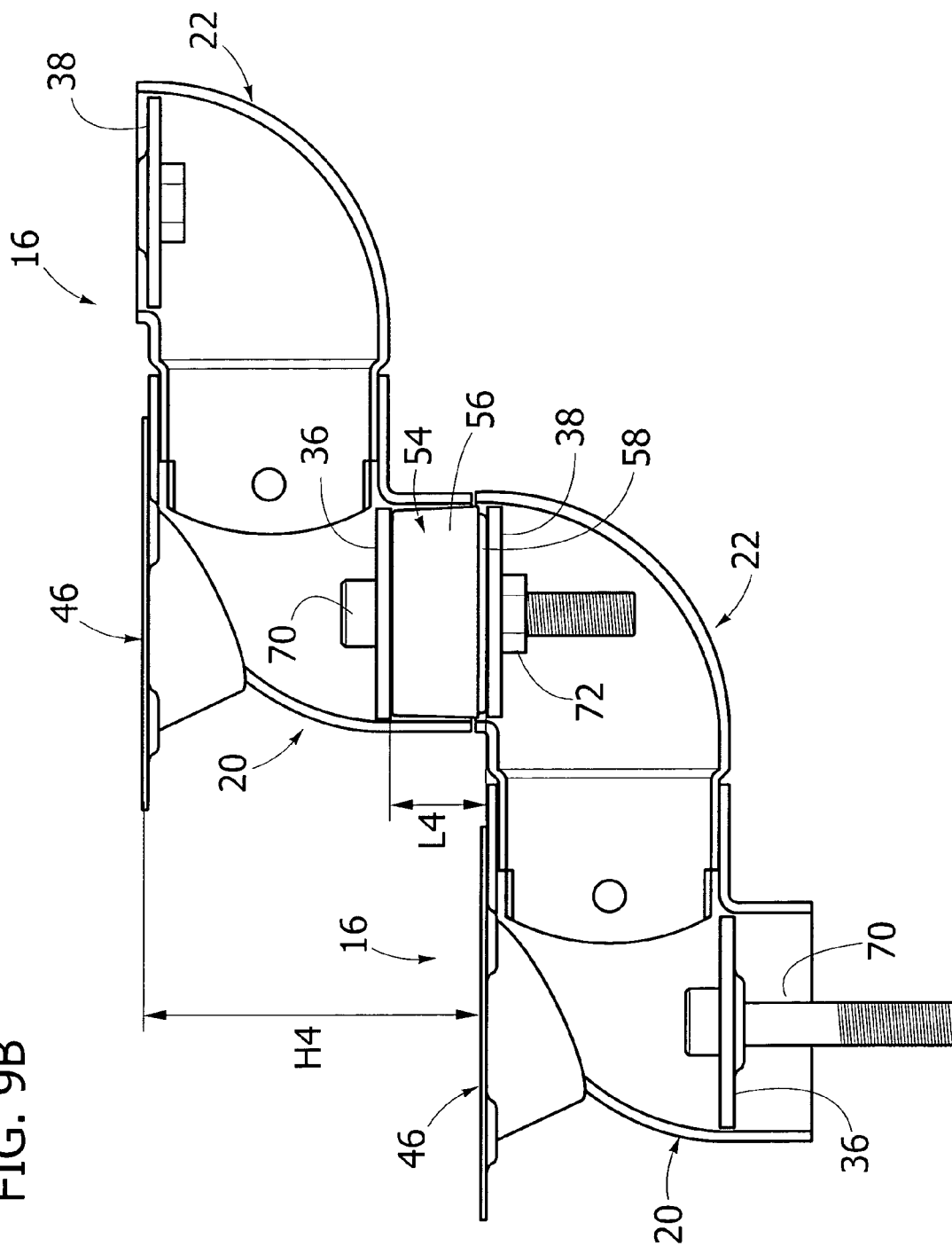


FIG. 9B



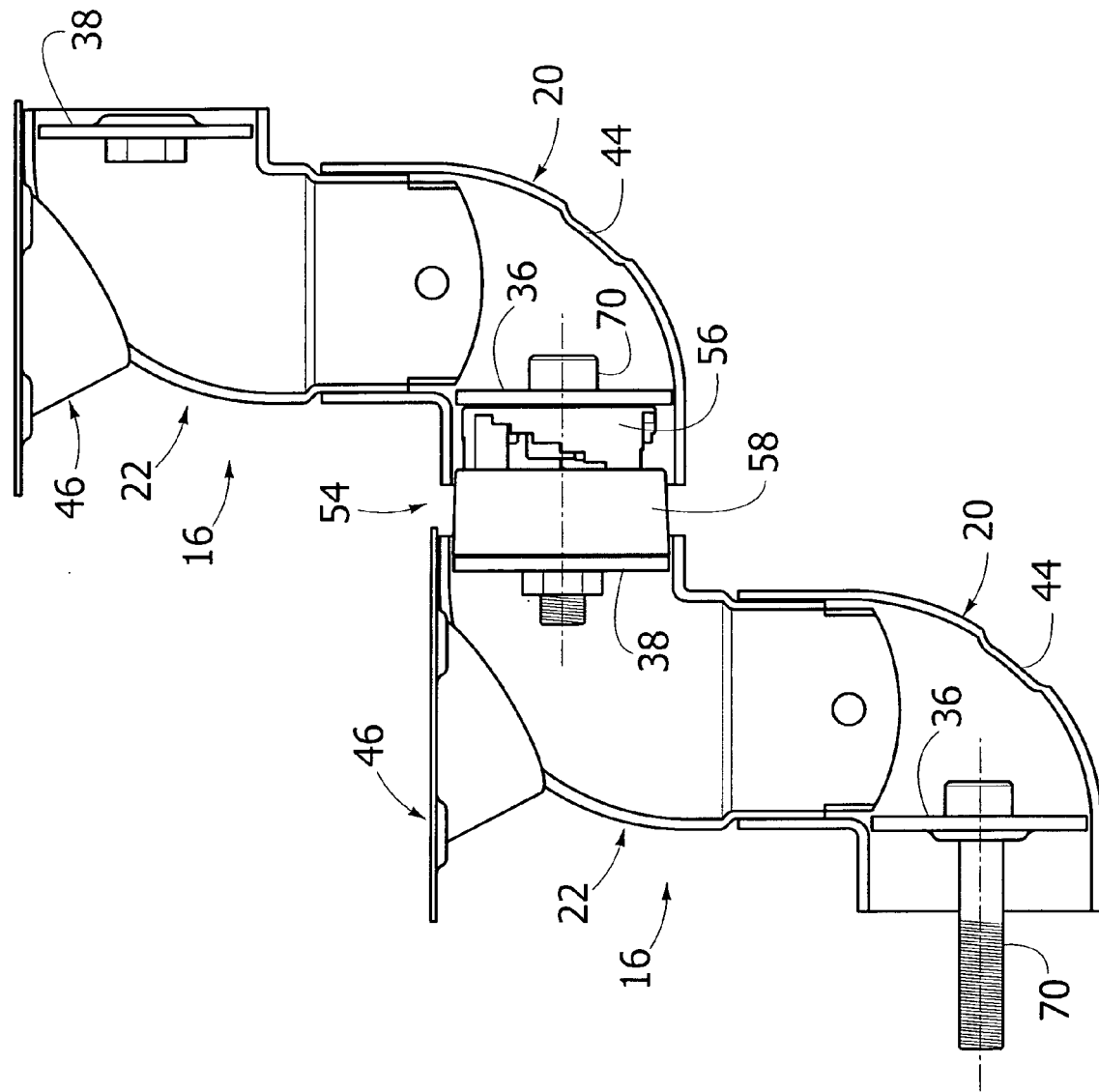


FIG. 10



EUROPEAN SEARCH REPORT

Application Number
EP 09 42 5011

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 15 May 2009	Examiner Bouyssy, Vincent
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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