



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
15.07.2009 Bulletin 2009/29

(51) Int Cl.:
F24F 13/02 (2006.01) F24F 13/24 (2006.01)

(21) Application number: **08167087.9**

(22) Date of filing: **21.10.2008**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT RO SE SI SK TR
Designated Extension States:
AL BA MK RS

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(30) Priority: **23.10.2007 IT BO20070071 U**

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Remarks:

Claims 16-19 are deemed to be abandoned due to non-payment of the claims fees (Rule 45(3) EPC).

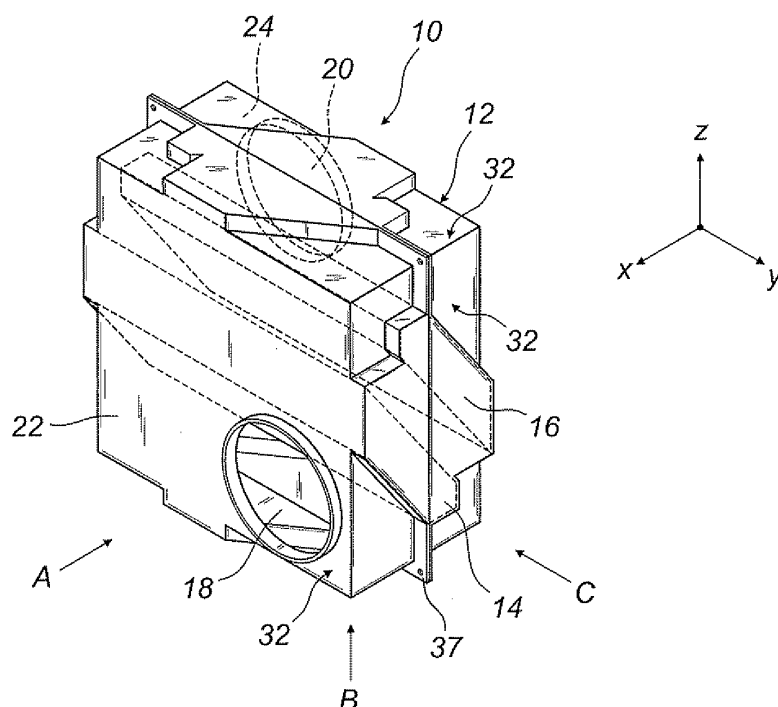
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(54) **Device for soundproofing at a ventilation opening in residential buildings**

(57) A device (10) for soundproofing a ventilation opening (18, 20) in buildings, particularly residential buildings, comprises a device (10) body (12) having

means (18, 20, 14, 16) forming an air passage. The device (10) body (12) has the shape of a box-shaped body containing soundproofing means (14, 16).

FIG. 1



Description

[0001] The present invention relates to the soundproofing of rooms and, more particularly it relates to a device for soundproofing residential rooms with reference to which the device may advantageously be used to soundproof ventilation openings for the exchange of air between the room and the outside. For some time now building technology has faced general problems relating to soundproofing buildings. With regard to this, there are currently precise building technical regulations defining the soundproofing features of the various building components and which set their minimum performance requirements allowed in terms of obtaining suitable room comfort for the occupants.

[0002] For some parts of the exterior walls of buildings and, more particularly, the openings and ducts provided for room ventilation, there is a prior art device which allows the passage of air without allowing noise to pass through the wall.

[0003] Said device comprises a tubular body, having an oval cross-section, and two tubular curves, which are connected at opposite ends of the tubular body and which respectively bear the air inlet and outlet openings.

[0004] The device may be fitted in a wall after preparing, in the wall, a suitable cavity for installation.

[0005] Preparation of the cavity is quite an invasive operation for the wall. It is rather laborious and takes quite a long time.

[0006] To create the cavity, first the interior part of the wall which is still to be plastered must be broken to make a long niche in it. Then, a suitably sized hole must be made which passes through the wall at the niche. The device is then fitted in the niche, with one of the curves inserted in the hole, after which it is secured in place in the niche by covering it with mortar or bricks in such a way that the end of the second curve projects from the surface of the wall. Finally, when enough time has passed for the masonry to set, strengthen and dry, the end of the second curve is trimmed, then the wall is plastered and painted with the device definitively incorporated in it.

[0007] Therefore, the present invention has for an aim to eliminate the disadvantages of the prior art with a soundproofing device which firstly is easy to insert in the wall, with minimal or no destructive work and with very short installation times.

[0008] The invention has for a second aim to provide a device able to give high level soundproofing performance which can be modulated according to diverse application requirements.

[0009] Another aim of the invention is to provide a device which is inexpensive to make, and, more particularly, whose manufacture requires a minimal number of pieces of equipment.

[0010] The technical features of the present invention according to the aforementioned aims may be clearly inferred from the content of the claims herein, in particular claim 1, and any of the claims that depend, either directly

or indirectly, on claim 1.

[0011] The advantages of the invention are more apparent from the detailed description which follows, with reference to the accompanying drawings which illustrate preferred embodiments of the invention provided merely by way of example without restricting the scope of the inventive concept, and in which:

- Figure 1 is a perspective assembly view, with reference to three orthogonal axes XYZ, representing a room soundproofing device in accordance with the present invention;
- Figure 2 shows the device of Figure 1, viewed along the X-axis and in the direction indicated by the arrow A of Figure 1;
- Figure 3 shows the device of Figure 1, viewed along the Z-axis and in the direction indicated by the arrow B of Figure 1;
- Figure 4 is a cross-section of the device according to the plane of line IV - IV of Figure 2, in which the device is seen in the direction indicated by the arrow C and along the Y-axis;
- Figure 5 is a perspective view of the device of Figure 1 represented in space with component parts disassembled and with some parts cut away for greater clarity;
- Figures 6 and 7 illustrate some of the inner components of the device - in particular those cut away in Figure 5 - which, relative to the reference system of Figure 1, are angled in such a way that they are parallel with the axis Y;
- Figure 8 is a plan view of one of the component parts of Figure 5;
- Figure 9 is a cross-section of the component part of Figure 8 according to the line IX - IX;
- Figure 10 is a side view of the component of Figure 8.

[0012] With reference to Figure 1 of the accompanying drawings, the numeral 10 denotes as a whole a device for soundproofing rooms which is preferably, but not exclusively, intended for soundproofing a ventilation opening in buildings, and, more particularly, in residential buildings.

[0013] The device 10 basically comprises a box-shaped body 12 having means forming an air passage through the body 12 and equipped with inner soundproofing means 14 and 16 designed to prevent the transmission of noise from the outside towards the inside of the home.

[0014] More particularly, the box-shaped body 12 has the shape of a prismatic block having a polygonal peripheral profile, and having bases which are preferably quadrangular.

[0015] The box-shaped body 12 has two large walls 22 and 24 which are substantially parallel with each other, and at right angles to the X-axis of Figure 1, which for brevity of description, will hereinafter be referred to as transversal walls. The transversal walls 22 and 24 are in

turn connected by perimeter walls 32, also called longitudinal walls 32, which are substantially parallel with the X-axis.

[0016] It shall be understood that the transversal walls 22 and 24 may respectively be connected: the former to an interior face of a building wall in which the device 10 is to be fitted, and the other to a face of the same wall facing towards the outside of the home.

[0017] The means forming the air passage consist of transit openings 18 and 20, made in the transversal walls 22 and 24 of the box-shaped body 12, and of a path extending inside the box-shaped body 12 and which is connected to the transit openings 18 and 20.

[0018] Figure 1 shows how the openings 18 and 20 are preferably offset relative to each other, that is to say, they are not aligned, so that for the air flowing along the path between the openings 18 and 20, due to the effect of ventilation exchange between the inside and the outside of the building, a connecting route is formed which, as illustrated with a dashed line in Figure 4, preferably has a zigzag shape, or that of an S-shaped curved line.

[0019] Figures 2 and 3 and the cross-section of the box-shaped body 12 in Figure 4 show how the zigzag or S-shaped curved route connecting the openings 18 and 20 is formed by soundproofing means delimiting and guiding the air along its path between the openings 18 and 20, at the same time soundproofing the device 10, in such a way as to prevent the transmission of noise through the building wall which contains it.

[0020] The soundproofing means comprise in particular sound deadening means consisting of a first and a second panel, respectively labelled 14 and 16. The panels 14 and 16 are made of sound deadening material, have a planar shape, are positioned at an angle relative to the longitudinal orientation X of the device 10 and are equidistant and parallel with each other.

[0021] The transversal profile of the panels 14 and 16 has a polygonal shape (Figures 6 and 7). A first end of the profile, labelled 14b and 16b has the shape of a substantially right angle dihedral and with the vertex close to a midplane 37 of the panel 14 and 16. A second, opposite end 14a and 16a of the profile, on the other hand, is shaped according to a substantially acute dihedral angle, with the vertex decidedly shifted to the side relative to the midplane 37 of the panel 14 and 16. The material of which the panels 14 and 16 are made is preferably a polyurethane. However, it is also possible to select another kind of materials to modulate the device 10 soundproofing performance as required.

[0022] Figure 5 and the detailed views in Figures 8, 9 and 10 also show how the box-shaped body 12 is preferably made of two separate component parts, respectively having the shape of a first and a second half-shell 12a and 12b which are connected in such a way that they mirror one another at a plane 36 which is substantially equatorial for the body 12 and is transversal to the X-axis.

[0023] The shape consisting of two half-shells 12a and 12b allows the whole box-shaped body 12 to be made

using a single mould to form both of the half-shells 12a and 12b. This allows a corresponding saving in terms of equipment which is reflected by lower production costs and, therefore, a lower cost for the end product.

[0024] To engage and retain the sound deadening panels 14 and 16 in the operating position, the box-shaped body 12 is also equipped with engagement and retaining means for the panels 14 and 16 which are preferably made at opposite inner faces 33 of the longitudinal perimeter walls 32 of the device 10 body 12. These means apply their engagement and retaining action in particular when the two half-shells 12a and 12b are assembled to form the overall body 12 of the device 10.

[0025] Figure 5 and Figures 8, 9 and 10 show how, in a preferred embodiment, the engagement and retaining means for each sound deadening panel 14 and 16 comprise sunken recesses 34, made on the inner faces 33 of the longitudinal perimeter walls 32 of the half-shells 12a and 12b. The recesses 34 are shaped in such a way that they connect with a corresponding narrow band 35, as illustrated in Figure 7, which is part of the outline of the transversal profile of the respective panel 14 and 16, as can be inferred from Figures 1 and 4. In this way, they lock the panel in a stable position when the two half-shells 12a and 12b are assembled in contact with each other on the equatorial plane 36 of the body 12.

[0026] More particularly, the recesses 34 comprise a first side with short tabs 26 and 28 and a second side, suitably distanced from and opposite the latter, which in turn has an extended oblique edge 30 that projects towards the inside of the respective half-shell 12a or 12b and which gradually slopes down until it reaches the inner face of the transversal wall 22 of the half-shell 12a and 12b. At a pair of opposite longitudinal perimeter walls 32 of the body 12, the panels 14 and 16 are locked on the outline end bands 35.

[0027] Figure 4 shows how each band 35 of the panels 14 and 16 remains locked in a stable position by a geometric connection securing its outline thanks to the combined contact action: of the tabs 26 and 28 of one of the two half-shells 12a or 12b, and of the oblique edge 30 and of the inner face of the transversal wall 22 and 24 of the other, opposite half-shell 12b or 12a. The band 35 edge profile of each panel 14 and 16 remains enclosed and locked, at a first half-shell 12a or 12b, by the tabs 26 and 28 which enclose one end 14b or 16b of the panels 14 or 16. The edge profile then makes contact with both the oblique edge 30 and with the inner face of the transversal wall 32 adjacent to the oblique edge 30 of the other half-shell 12b or 12a. The geometric interaction between the polygonal shape of the band 35 edge profile and the shape of the recesses 34 immobilises the panels 14 and 16 and holds them in position.

[0028] Due to the distance separating the sides of a recess 34, the panels 14 and 16 are kept in position and suitably spaced out, thus forming the above-mentioned air transit routes.

[0029] The recesses 34 are preferably made on the

four sides of all of the inner faces 33 of the half-shells 12a and 12b. As already said, this allows a single mould to be used to make the two half-shells 12a and 12b to be connected to each other to form the box-shaped body 12 described above.

[0030] The invention fulfils the aim of allowing air to pass between the openings 18 and 20 for ventilation, without allowing noise from the outside to reach the rooms inside the building by passing through the device 10.

[0031] Moreover, the prismatic shape of the body 12 easily allows the device 10 to be given modular proportions, making it particularly suitable for easy integration in building walls or structures without special destructive work and/or preparation of the wall.

[0032] Another economic and productive advantage can be derived from the fact that by combining panels 14 and 16 made of different materials in the same body 12 it is easy to modulate the same device 10 performances, thus allowing it to satisfy considerably different application requirements.

[0033] The geometric shape of the half-shells 12a and 12b, which can be obtained using a single mould, allows significant savings in terms of component production and storage. This helps to make the device 10 as a whole relatively inexpensive.

[0034] The invention described above is susceptible of industrial application and may be modified and adapted in several ways without thereby departing from the scope of the inventive concept. Moreover, all details of the invention may be substituted by technically equivalent elements.

Claims

1. A device (10) for soundproofing rooms, in particular for soundproofing a ventilation opening (18, 20) in buildings, particularly residential buildings, comprising a device body (12) having means (18, 20, 14, 16) forming an air passage; **characterised in that** the device (10) body (12) has the shape of a box-shaped body containing soundproofing means (14, 16).
2. The device according to claim 1 or according to the preamble to claim 1, **characterised in that** the device body (12) has the shape of a prismatic block having a polygonal peripheral profile.
3. The device according to any of the foregoing claims, **characterised in that** the device body (12) has quadrangular bases (22, 24, 32).
4. The device according to any of the foregoing claims, **characterised in that** the device (10) body (12) has a first and a second air transit openings (18, 20) located opposite each other and connected by a path inside the device (10) body (12).
5. The device according to claim 4, **characterised in that** the openings (18, 20) are offset from each other, that is to say, they are not aligned.
6. The device according to claim 4 or 5, **characterised in that** the device (10) body (12) has a large interior transversal wall (22) and a large exterior transversal wall (24) which are connected by perimeter walls (32), where the first and second openings (18, 20) are at opposite zones of the interior and exterior walls (22, 24).
7. The device according to any of the foregoing claims or according to the preamble to claim 1, **characterised in that** it forms a zigzag, or curved, route (S) for the ventilation air.
8. The device according to claim 7, **characterised in that** the zigzag route is formed by sound deadening means (14, 16).
9. The device according to any of the foregoing claims, **characterised in that** the soundproofing means comprise a first sound deadening panel (14).
10. The device according to any of the foregoing claims, **characterised in that** the soundproofing means comprise a second sound deadening panel (16).
11. The device according to any of the foregoing claims, **characterised in that** the respective sound deadening panel (14, 16) is positioned in such a way that it is at an angle relative to the longitudinal orientation of the device.
12. The device according to any of the foregoing claims, **characterised in that** the first and second sound deadening panels (14, 16) are parallel with and spaced out from each other.
13. The device according to any of the foregoing claims, **characterised in that** the sound deadening means (14, 16) are made of polyurethane.
14. The device according to any of the foregoing claims or according to the preamble to claim 1, **characterised in that** the device (10) body (12) comprises a first and a second half-shell (12a, 12b) which are connected in such a way that they mirror one another.
15. The device according to any of the foregoing claims or according to the preamble to claim 1, **characterised in that** it comprises engagement and retaining means (26, 28, 30, 32) for the sound deadening panel.
16. The device according to claim 15, **characterised in**

that the engagement and retaining means for the sound deadening panel (14, 16) are at opposite inner faces (33) of the peripheral walls (32) of the device (10) body (12).

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17. The device according to claim 15 or 16, **characterised in that** the engagement and retaining means for the sound deadening panel (14, 16) comprise corresponding short tabs (26, 28) designed to make contact with the respective sound deadening panel (14, 16).

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18. The device according to any of the foregoing claims from 15 to 17, **characterised in that** the engagement and retaining means for the sound deadening panel (14, 16) comprise corresponding oblique edges (30) at opposite inner faces of the peripheral walls (22, 24) of the device (10) body (12).

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19. The device according to any of the foregoing claims, **characterised in that** the sound deadening panel (14, 16) has one end (14a, 16b) in contact with the inner face of the respective transversal wall (22, 24) and the other end (14b, 16b) distanced from the opposite transversal wall (24, 22).

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FIG. 1

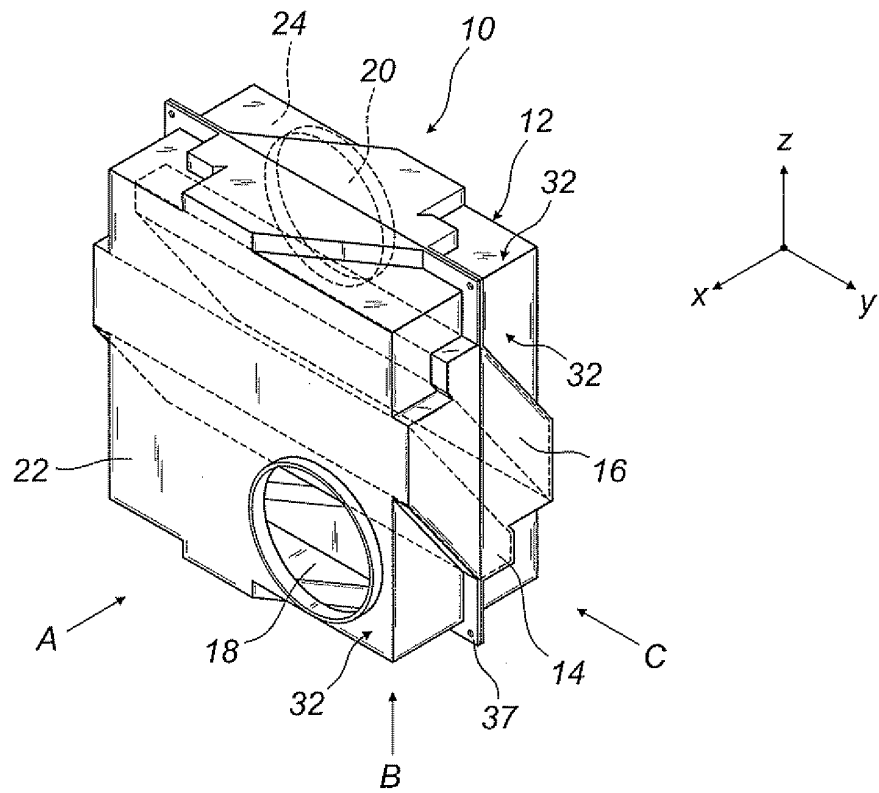


FIG. 2

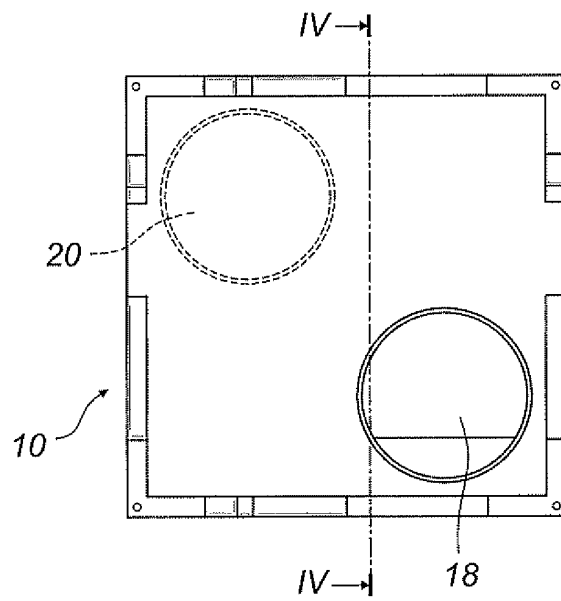


FIG. 3

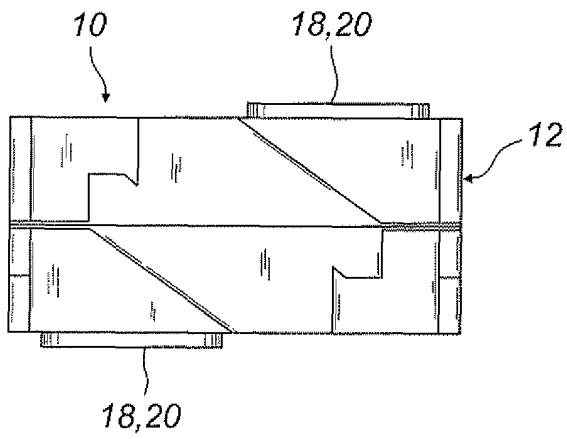


FIG. 4

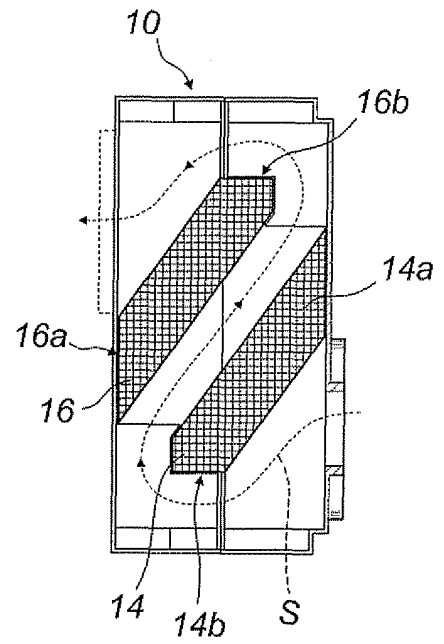


FIG. 5

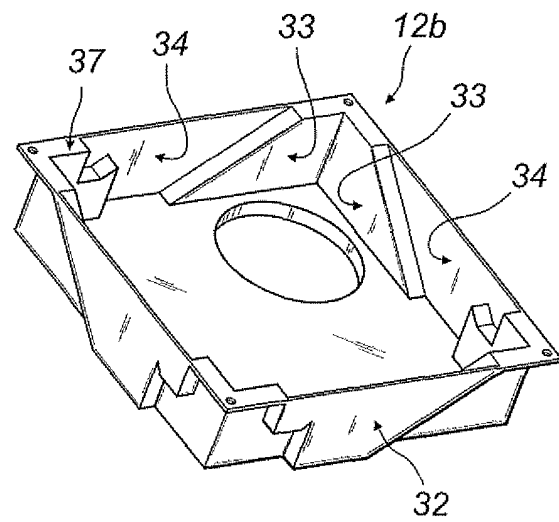
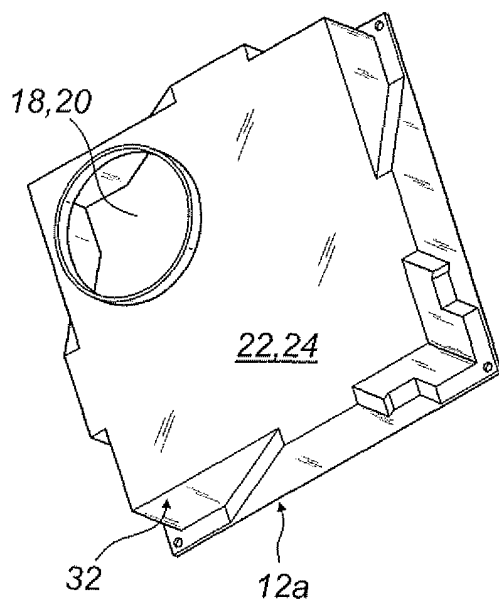


FIG. 6

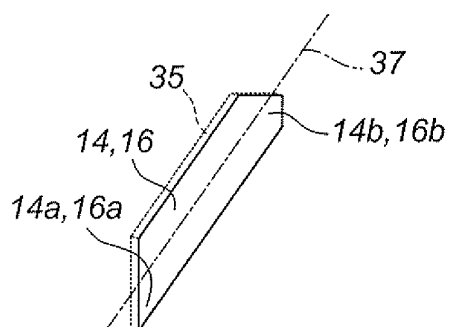


FIG. 7

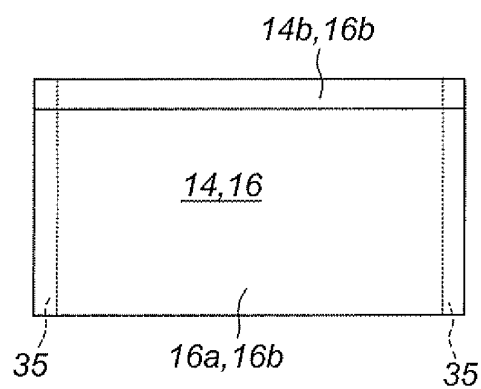


FIG. 8

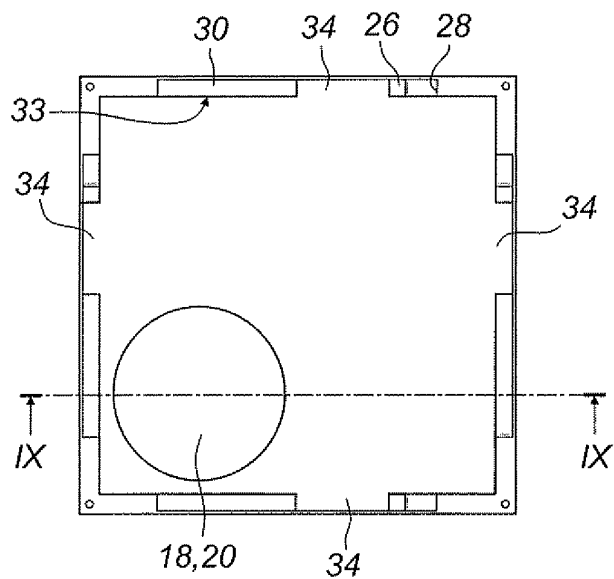


FIG. 10

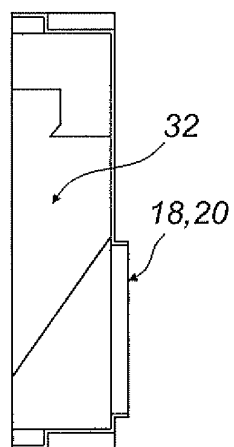


FIG. 9

