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(54) **RECESSED VENT FOR SUPPLYING OR EXTRACTING AIR INTO/FROM A ROOM**

(57) A recessed vent for supplying or extracting air into/from a room, comprising a frontally open box-shaped body (2) configured to be housed in a compartment bounded by at least one wall (40, 41), and a front grille (7) fixable to the body (2), characterized by comprising a frame (6) provided with a seat for the grille (7) and a perimeter abutment surface (9); the frame (6) is configured to be mounted to the body (2) in a first and a second arrangement, wherein the abutment surface (9) faces the body (2) and, respectively, faces away from the body (2); the vent (1) comprises adjustment means (15, 13, 24) for varying the distance between the frame (6) and the body (2), the grille (7) being fixable to the frame (6) in the first and second arrangements thereof so as to lie outside the wall (41) or flush with the wall, respectively.

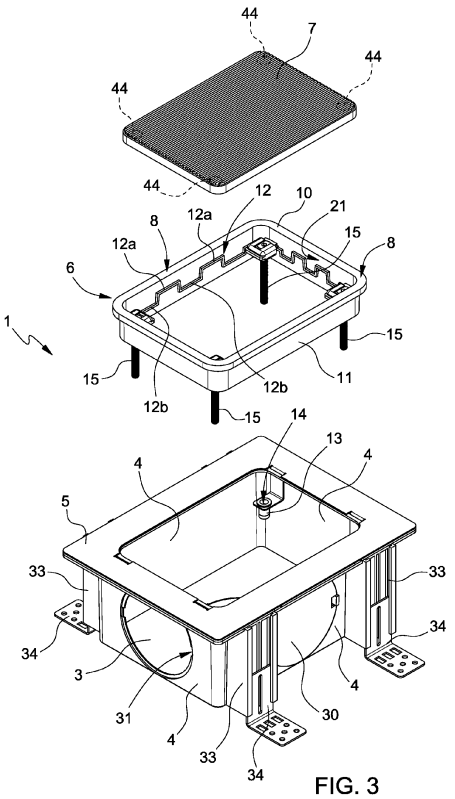

FIG. 3

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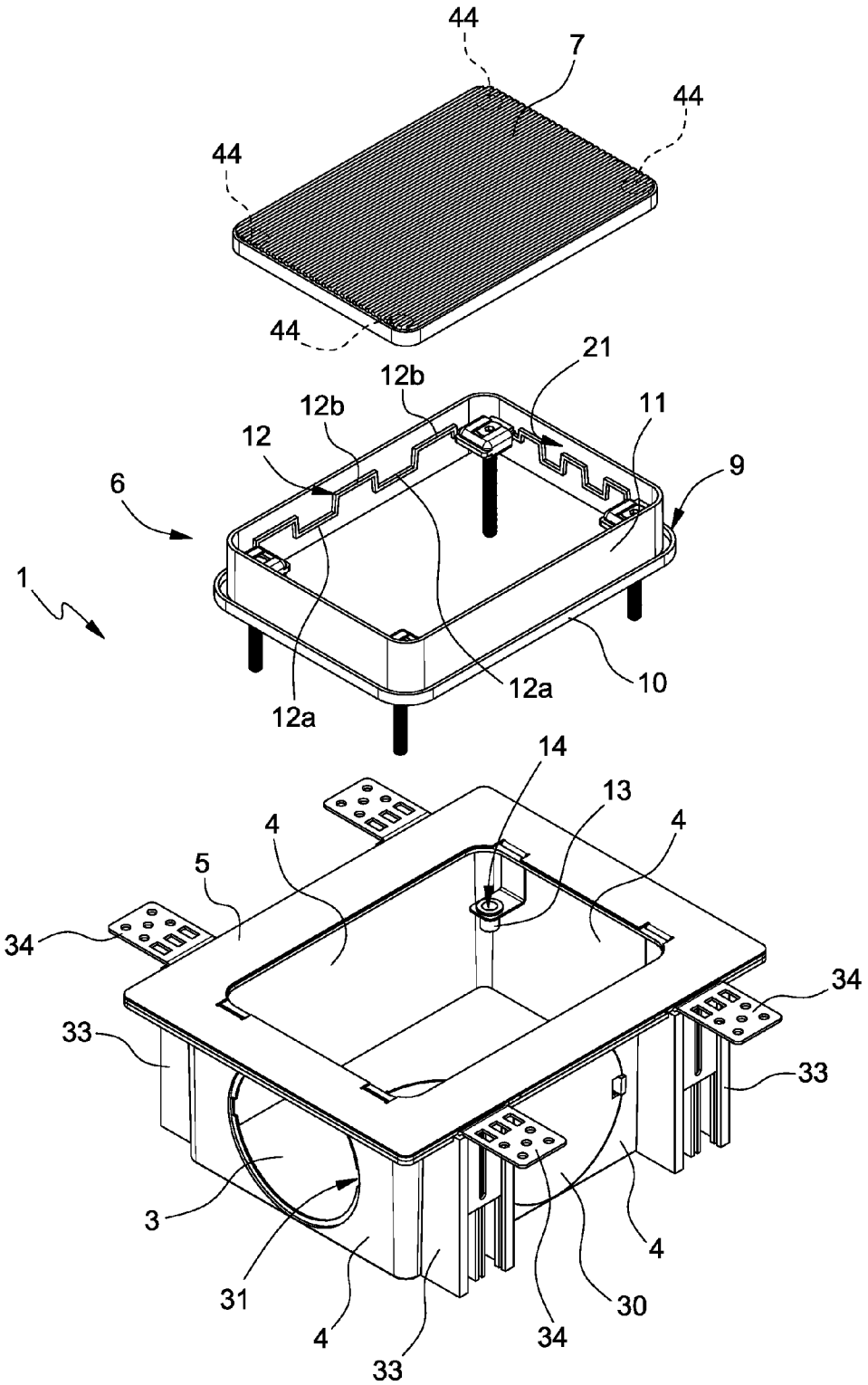
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FIG. 4

Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This patent application claims priority from Italian patent application no. 102021000032471 filed on December 23, 2021, the entire disclosure of which is incorporated herein by reference.

TECHNICAL FIELD

[0002] The present invention concerns a recessed vent for supplying or extracting air into/from a room.

BACKGROUND

[0003] Vents of the above-mentioned type are known, which comprise a frontally open box-shaped body or plenum and a front grille. The plenum is provided with one or more openings for connection to a duct of a conditioning and/or controlled mechanical ventilation plant and is designed to be recessed in a compartment provided in a wall, for example a plasterboard wall. The grille is generally mounted in contact with the wall, so as to frontally close the body and adhere to the wall around the compartment. In this way, any irregularities in the edge of the compartment are concealed from view.

[0004] Vents are also known in which the grille is mounted flush with the wall in an opening of the wall having predefined dimensions.

[0005] The known vents are suitable for one or the other application.

[0006] This is a drawback not only for the manufacturer, who has to produce different components for the two versions, with higher production and storage costs, but also for the installers, who have to obtain the two different versions.

SUMMARY

[0007] The object of the present invention is the production of a universal vent, that solves the above-mentioned problem.

[0008] The above-mentioned object is achieved by a recessed vent for supplying or extracting air into/from a room comprising a frontally open box-shaped body and configured to be housed in a compartment bounded by at least one wall, a front grille fixable to a frame, which is provided with a seat for the grille and a perimeter abutment surface, the frame being configured to be mounted on the body in a first and in a second arrangement, in which the abutment surface faces the body and, respectively, faces away from the body, and comprising adjustment means for varying the distance between the frame and the body, the grille being fixable to the frame in the first and in the second arrangement thereof so as to lie outside the wall or flush with the wall, respectively.

[0009] Thanks to the present invention, the vent is suitable for applications with external grille and applications flush with the wall, thus achieving economies of scale. Furthermore, an installer can purchase one single type of vent for use in both types of application.

[0010] Preferably, the adjustment means comprise a screw system.

[0011] According to a preferred embodiment, the screw system comprises a plurality of screws axially constrainable to the frame and engaging respective threaded holes of the body.

[0012] In this way it is possible to adjust the distance between the body and the frame accurately and in both directions, so that the frame is perfectly matched with an outer or inner surface of the wall.

[0013] Preferably, the screws are axially constrained to the frame by means of releasable locking elements. This allows inversion of the frame for the two possible installation configurations. According to a preferred embodiment, the frame comprises a plurality of through holes for the screws, and the locking elements are configured to fit on the frame in the vicinity of the holes so as to cooperate with respective heads of the screws.

[0014] Preferably, the holes are obtained in internal projections of the frame and define a seat for the head of the respective screw; the locking elements are U-shaped and configured to fit on the respective projection and axially lock the head of the screw, allowing implementation thereof.

[0015] In this way, the assembly is particularly simple.

[0016] According to an embodiment of the invention, the grille is locked in the frame seat by magnetic means. In this way, no discontinuities or fixing elements can be seen.

[0017] Optionally, the mount comprises first supports for housing the grille flush with a flat face of the frame opposite the abutment surface and second supports for housing the grille flush with the frame in the second configuration of the frame. In this way, the grille is always perfectly flush with the frame.

[0018] Preferably, the body comprises guides for housing fixing brackets, said guides being configured to house the brackets in a first position for the front fixing of the body and a second position for the rear fixing of the body. In this way maximum versatility of application is obtained.

[0019] According to a preferred characteristic of the invention, the body comprises a back wall and four side walls facing each other two by two; the back wall and at least two adjacent side walls are provided with removable portions to define an opening for the connection of a duct. Therefore the vent is suitable for connection to a duct extending vertically or horizontally, on both sides.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] For a better understanding of the invention, a preferred embodiment is illustrated below, by way of non-limiting example and with reference to the attached drawings, in which:

figure 1 is a perspective view of a recessed vent according to the present invention, in a first configuration thereof;
figure 2 is a perspective view of the vent in a second configuration thereof;
figure 3 is an exploded perspective view of the vent in the first configuration thereof;
figure 4 is an exploded perspective view of the vent in the second configuration thereof;
figures 5, 6 and 7 illustrate a detail of the vent during successive assembly stages;
figures 8 and 9 illustrate the vent in a side elevation, in the first and in the second configuration respectively, installed inside a compartment of a wall.

DESCRIPTION OF EMBODIMENTS

[0021] With reference to figures 1 to 4, the number 1 indicates overall a recessed vent for supplying or extracting air into/from a room produced according to the present invention.

[0022] The vent 1 comprises a box-shaped body or plenum 2, having a substantially parallelepipedal frontally open shape and comprising a back wall 3, four side walls 4 facing each other two by two and a frontal perimeter flange 5 extending outwards from a frontal edge of the side walls 4.

[0023] The body 2 is designed to be recessed in a compartment obtained in a wall, as can be seen in figures 7 and 8, and will be described in further detail below.

[0024] The vent 1 further comprises a rectangular frame 6 arranged parallel to the back wall 3 and designed to be connected to the body 2 inside the flange 5.

[0025] Lastly, the vent 1 comprises a grille 7 designed to be removably fixed to the frame 6 so as to frontally bound the body 2, allowing passage of the air.

[0026] As can be clearly seen from the comparison between figures 3 and 4, the frame 6 can be fixed to the body 2 in two different arrangements, upturned with respect to each other, and its distance from the body 2 can be adjusted as described below.

[0027] In particular, in the non-limiting example illustrated, the frame comprises a perimeter flange 10 provided with a flat face 8 (figures 3, 9) and an opposite abutment surface 9 (figure 4), and can be fixed to the body 2 with the flat face 8 facing the front and the abutment surface facing the body 2 (figures 1, 3, 8) or with the flat face 8 facing the body 2 and the abutment surface 9 facing the front (figures 2, 4, 9).

[0028] The frame 6 further comprises a mount 11 extending from an internal edge of the perimeter flange 10 in the area of the abutment surface 9; the mount 11 defines internally a seat 21 designed to house the grille 7 and has along an inner surface thereof a projection in the shape of a Greek key pattern 12 defining two sets of supports 12a, 12b for the grille. The supports 12a are arranged so as to define an abutment surface for the grille 7 such that the grille 7, when introduced into the mount 11 in the area of the flat face 8 of the frame 6, is flush with said face (figure 3). The supports 12b are arranged so as to define an abutment surface for the grille 7 such that the grille 7, when introduced into the mount 11 in the area of the abutment surface 9 of the frame 6, is flush with one end of the mount 11 opposite the perimeter flange 10 (figure 4). The axial extension of the mount 11 beyond the abutment surface 9 of the frame 6 is expediently equal to the typical thickness of a double layer plasterboard wall (fig. 9).

[0029] The body 2 carries integrally four cylindrical bushes 13, having axes perpendicular to the back wall 3 and arranged in the vicinity of the internal corners of the body 2. The bushes 13 are provided with respective threaded axial holes 14 for respective screws 15 for connecting the frame 6. The screws 15 expediently have a countersunk socket head 16 and a threaded stem 17.

[0030] The frame 6 has in turn four internal projections 18 in the shape of a square plate, arranged in the vicinity of the internal corners of the frame and in a position facing the bushes 13 of the body 1.

[0031] More in particular, the projections 18, one of which can be clearly seen in figures 5 and 6, extend on opposite sides of the frame 6 towards the inside, in the vicinity of the internal corners of the frame 6. The projections 18 are each provided with a through hole 19 for the stem 17 of the respective screw 15 with a flared portion 20 having the function of a seat for the head 16 of the screw 15 (figure 5).

[0032] Lastly, the vent 1 comprises four locking elements 24, designed to slidingly couple with the respective projections 18. Each locking element (figures 5-7) is substantially U-shaped and comprises a pair of longitudinal portions 25 parallel to each other and a transverse portion 26 integrally connecting to each other respective ends of the longitudinal portions 25. The latter have a substantially C-shaped cross section with concavities facing each other so as to define respective internal seats 27 slidingly couplable with respective lateral edges of the projections 18 (figure 6).

[0033] The longitudinal portions are spaced from each other by a distance greater than the diameter of the stem 17 but less than the maximum diameter of the head 16 of the screws 15, so as to axially lock the head 16 in the seat 20 while allowing access to the hexagon socket of the head 16 by means of a key (figure 7) .

[0034] The body 2 of the vent 1 is expediently provided with circular removable portions 30 made on the back wall 3 and on a pair of side walls 4 adjacent and orthogonal to each other. In figures 1, 2, 3 and 4 one of the removable portions is removed, thus leaving free a circular opening 31. In figures 1 and 2 a coupling 32 is illustrated designed to be connected, for example by bayonet coupling, to the circular opening 31; a duct (not illustrated) of a conditioning and/or controlled mechanical ventilation plant can be connected to this coupling 32 in a known way. Thanks to the presence of three removable portions 30 arranged as described, the body 2 can be

connected to a lateral, vertical or rear duct by removing the corresponding removable portion 30.

[0035] Lastly, the body 2 has a plurality of guides 33 to slidingly house fixing brackets 34.

[0036] There are expediently four guides 33, arranged two by two on opposite side walls 4 and extending at the sides of the respective side walls 4 in a direction perpendicular to the back wall 3. The brackets 34 are expediently L-shaped and can be fitted in the respective guides or in the area of the back wall (figures 1, 3) or in the area of the front flange 5 of the body 2 (figures 2, 4), so as to allow fixing on a back wall 40 of the compartment in which the vent is recessed (rear fixing - figure 8), or on a front wall 41 that frontally bounds said compartment (front fixing - figure 9) and is provided with an opening 42 for housing the mount 11 of the frame 6.

[0037] It should be noted that the two fixing methods, illustrated by way of example with reference to the first configuration of the vent (figure 1) and, respectively, the second configuration of the vent (figure 2), do not depend on said configuration but only on the conditions of constraint and possibilities of access existing in the specific situation; therefore it is also possible to use a front fixing in the first configuration and a rear fixing in the second configuration.

[0038] Assembly of the vent 1 is described below, first with reference to the first assembly configuration (with external grille) illustrated in figures 1, 3 and 8, in the case of rear fixing.

[0039] In this configuration, first the body 2 is fixed to the wall 40 by means of the brackets 34. Subsequently, the frame 6 is fixed to the body 2.

[0040] At this point the front wall 41 is cut to size and applied, if the wall is made of plasterboard, providing the opening 42, the dimensions of which approximate by excess the transverse dimensions of the mount 11 of the frame 6 and the edges of which frontally match the flange 5 of the main body 2.

[0041] To fix the frame 6 to the body 2, the screws 15 are inserted in the holes 19 of the projections 18 of the frame 6 (figure 5), so that the relative head 16 is housed in the tapered seat 20 (figure 6). The screws 15 are then axially locked with respect to the frame 6, inserting the locking elements 24 on the projections 18 (figures 6 and 7).

[0042] The frame 6 can now be fixed to the body 2 by tightening the screws 15 in the holes 14 of the body 2. By tightening the screws 15, the frame 6 moves progressively towards the body 2 until the abutment surface 9 of the flange 10 abuts against the front wall 41 (figure 8). Any dimensional imperfections of the opening 42 of the front wall 41 are therefore concealed from view.

[0043] The last assembly stage consists in application of the grille 7. The fixing of the grille 7 is expediently of magnetic type. For this purpose, magnets 44 can be fixed to the grille 7 (figures 3 and 4) designed to cooperate with the heads 16 of the screws 15, if ferromagnetic, or with corresponding ferromagnetic elements embedded in the frame 6 (not illustrated). The grille 7 can be provided with at least one notch along a side thereof for the insertion of a tool, for example a screwdriver, to remove the grille 7 from the frame 6, if necessary.

[0044] In the second configuration, and in the case of front fixing illustrated in figure 9, the frame 6 must be preassembled on the body 2 before fixing the latter to the front wall 41; in this case the frame 6 is mounted in an upturned position, namely with the flat face 8 facing the body 2.

[0045] For assembly, the screws 15 are inserted in the holes 19 of the projections 18 and tightened in the bushes 13 of the body 2, until the frame 6 is brought near to the body 2. The locking elements 24 can be inserted also after tightening of the screws 15.

[0046] The frame 6 is then mounted on the body 2 so that the flat face 8 abuts against the flange 5 of the body 2 providing an air seal.

[0047] The body 2 is then fixed to the front wall 41 by means of the brackets 34, so that the mount 11 of the frame 6 is arranged inside the opening 42.

[0048] Lastly, the grille 7 is mounted in the frame 6, the grille being flush with the wall as described above.

[0049] If the vent in its second configuration is mounted with rear fixing, it is possible to fix first the body 2 to the rear wall 40 and then fix the frame 6 to the body 2. The front wall 41 provided with the opening 42 is then applied.

[0050] From an examination of the characteristics of the vent 1 produced according to the present invention, the advantages it offers are evident.

[0051] The possibility of assembling the frame 6 in two configurations, one upturned relative to the other, in combination with the adjustable connection between the body 2 and the frame 6, allows the vent 1 to be assembled in a configuration with grille overlapping the wall and in a second configuration flush with the wall.

[0052] This results in economies of scale in terms of both production and utilisation, and greater ease of application.

[0053] Furthermore, the possibility of fixing the body at the rear or at the front increases the versatility of use and adaptability to different specific conditions.

[0054] Lastly, it is clear that modifications and variations can be made to the vent 1 described that do not depart from the protective scope defined by the claims.

[0055] In particular, the adjustment system for adjusting the relative distance between body 2 and frame 6 can be modified.

Claims

1. A recessed vent for supplying or extracting air into/from a room, comprising a frontally open box-shaped body (2) configured to be housed in a compartment bounded by at least one wall (40, 41), and a front grille (7) fixable to the body (2), **characterized by** comprising a frame (6) provided with a seat for

the grille (7) and a perimeter abutment surface (9), the frame (6) being configured to be mounted to the body (2) in a first and a second arrangement, wherein the abutment surface (9) faces the body (2) and, respectively, faces away from the body (2), and comprising adjustment means (15, 13, 24) for varying the distance between the frame (6) and the body (2), the grille (7) being fixable to the frame (6) in the first and second arrangements thereof so as to lie outside the wall (41) or flush with the wall, respectively.

2. Vent as claimed in claim 1, wherein said adjustment means comprises a screw system (15, 13, 24).

3. Vent as claimed in claim 2, wherein said screw system comprises a plurality of screws (15) axially constrained to the frame (6) and engaging respective threaded holes (14) of the body (2).

4. Vent as claimed in claim 3, comprising releasable locking elements (24) for axially constraining the screws (15) to the frame (6).

5. Vent as claimed in claim 4, wherein the frame (6) comprises a plurality of through holes (19) for said screws (15), and the locking elements (24) are configured to fit on the frame (6) in proximity to the holes (19) so as to cooperate with respective heads (16) of the screws (15).

6. Vent as claimed in claim 5, wherein said holes (19) are machined in internal projections (18) of the frame (6) and define a seat (20) for the head (16) of the respective screw (15), said locking elements (24) being U-shaped and configured to fit on the respective projection (18) and axially lock the head (16) of the screw (15) allowing implementation thereof.

7. Vent as claimed in any one of the preceding claims, wherein the grille (7) is locked in the frame (6) by magnetic means.

8. Vent as claimed in claim 6 or 7, wherein the frame (6) comprises a mount (11) provided with first supports (12a) for housing the grille (7) flush with a flat face (8) of the frame (8) opposite the abutment surface (9) and second supports for housing the grille flush with the mount (11) of the frame (6) in the second configuration of said frame (6).

9. Vent according to any one of the preceding claims, wherein the body (2) comprises guides (33) for housing fixing brackets (34), said guides (33) being configured to house the brackets (34) in a first position for front fixing of the body (2) and a second position for rear fixing of the body (2).

10. Vent according to any one of the preceding claims, wherein the body (2) comprises a back wall (3) and four side walls (4) facing each other two-by-two, wherein the back wall (3) and at least two adjacent side walls (4) are provided with removable portions (30) to define an opening (31) for connecting a duct.

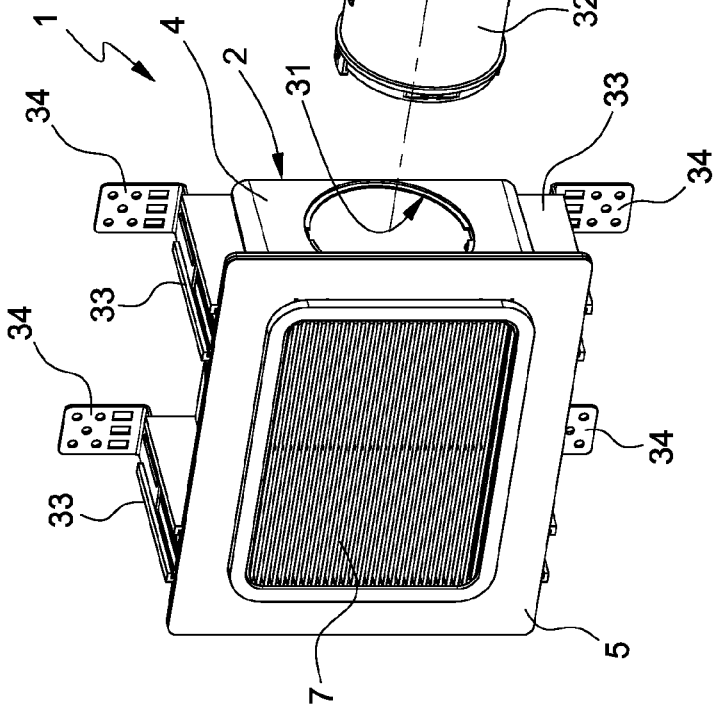

FIG. 1

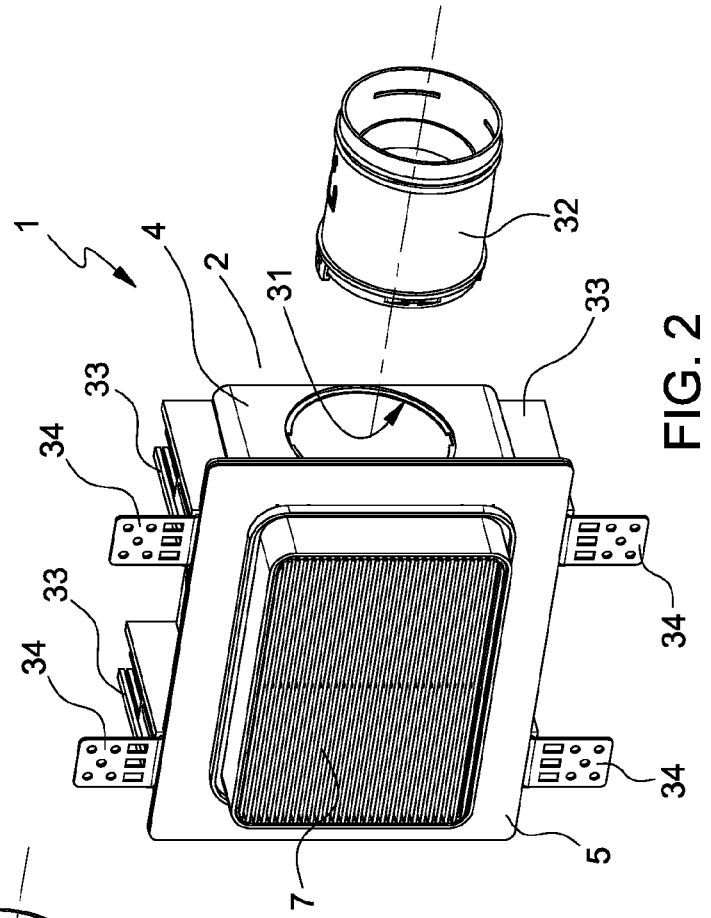

FIG. 2

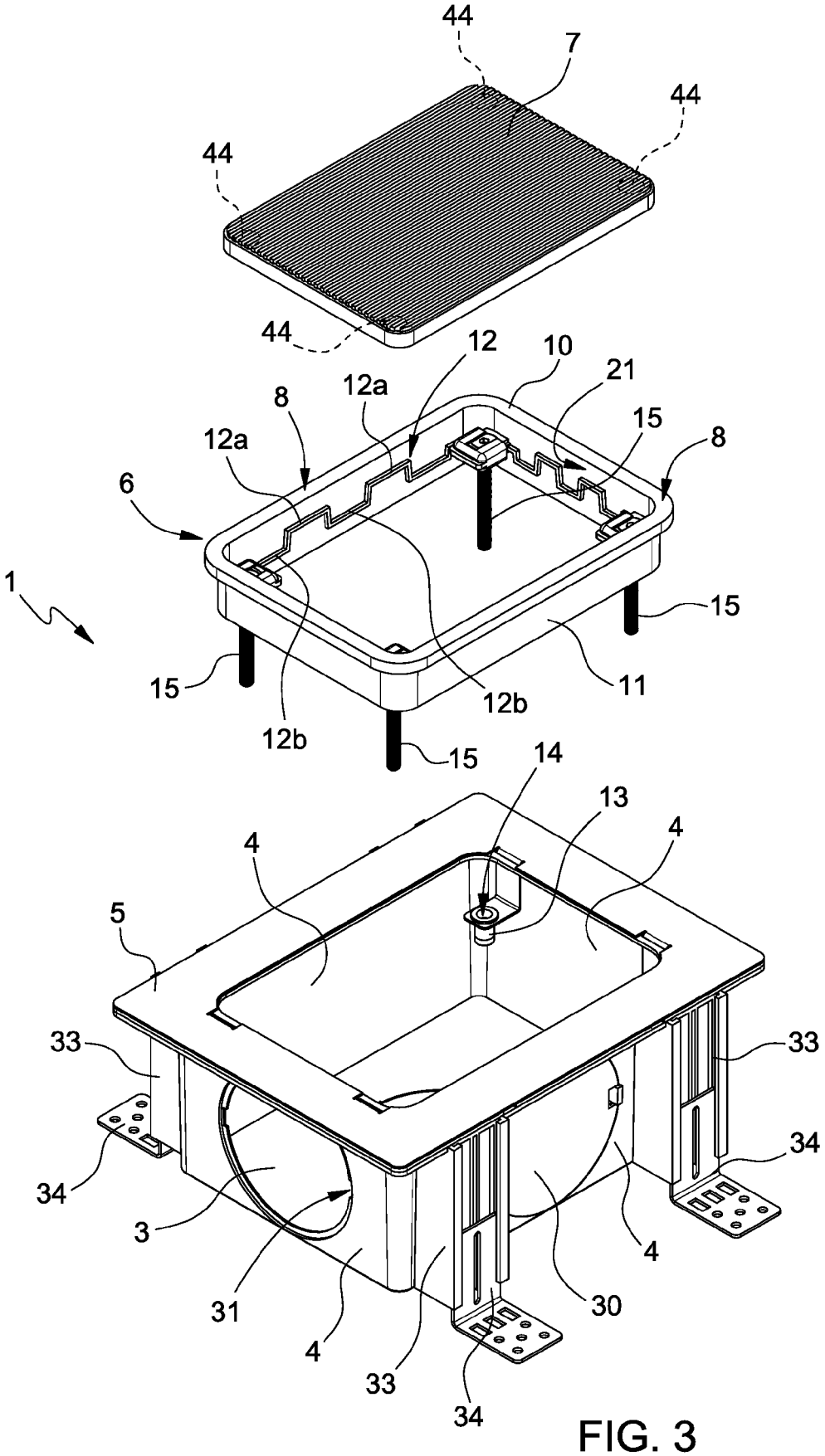
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FIG. 3

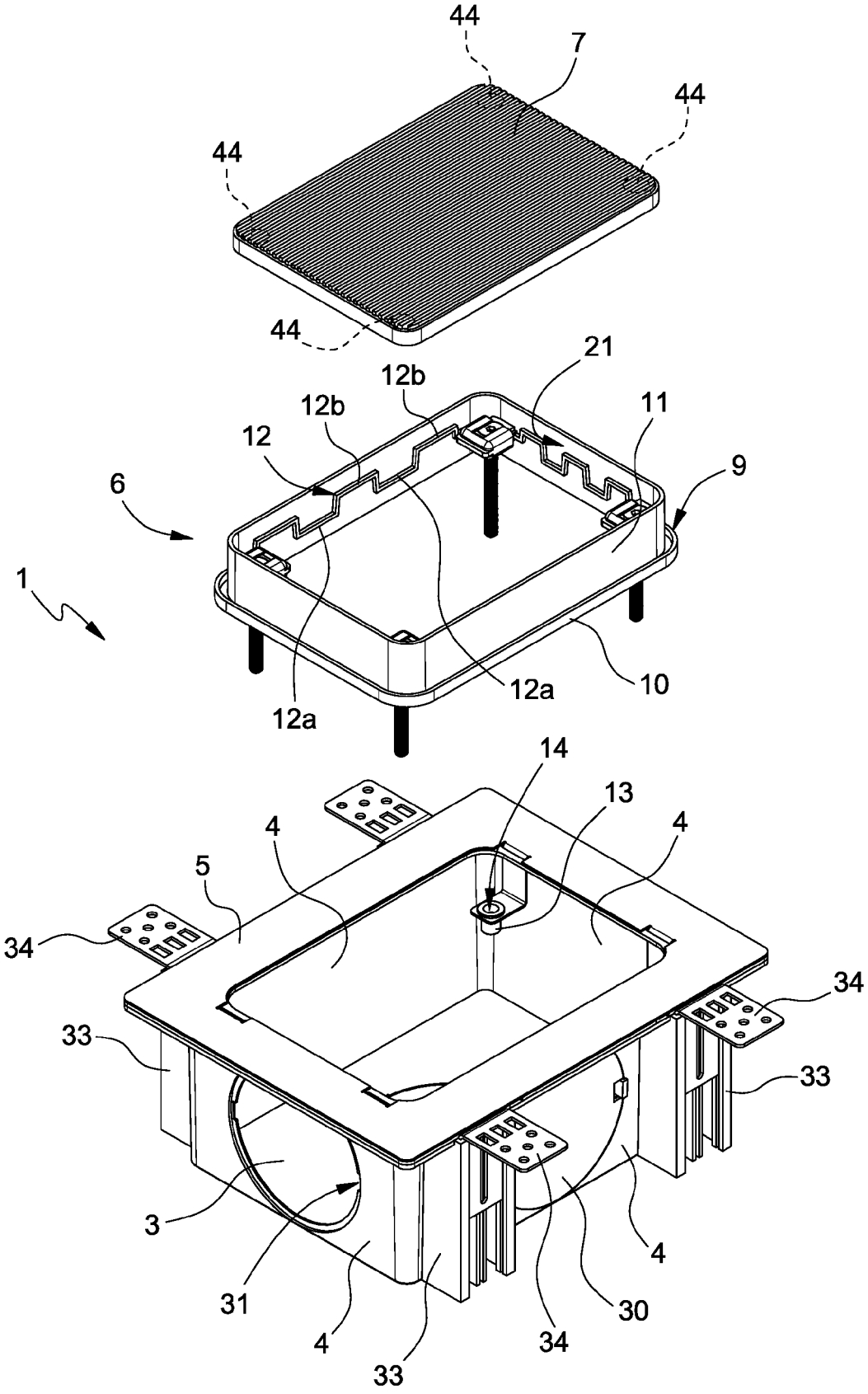
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FIG. 4

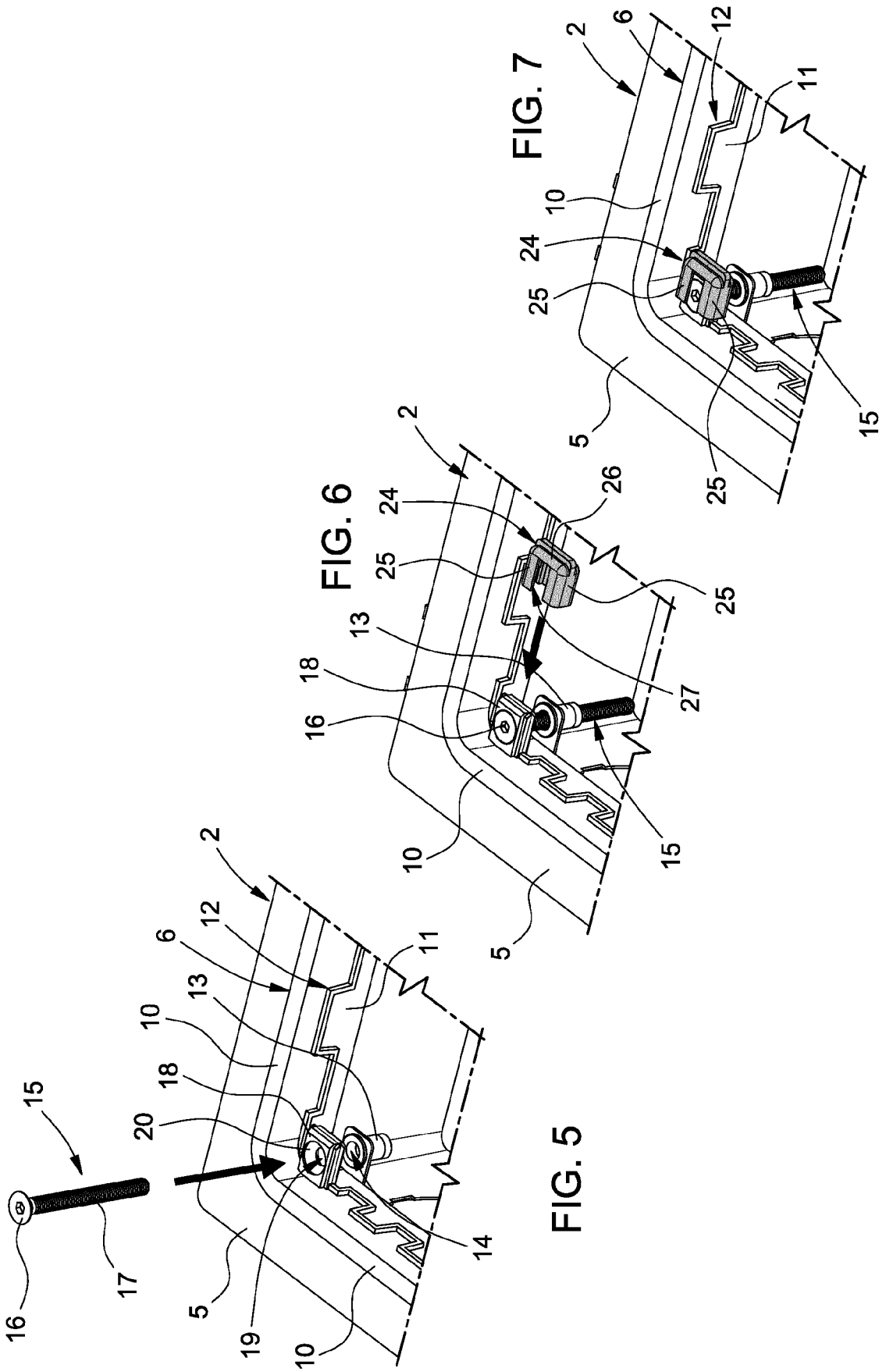
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FIG. 7

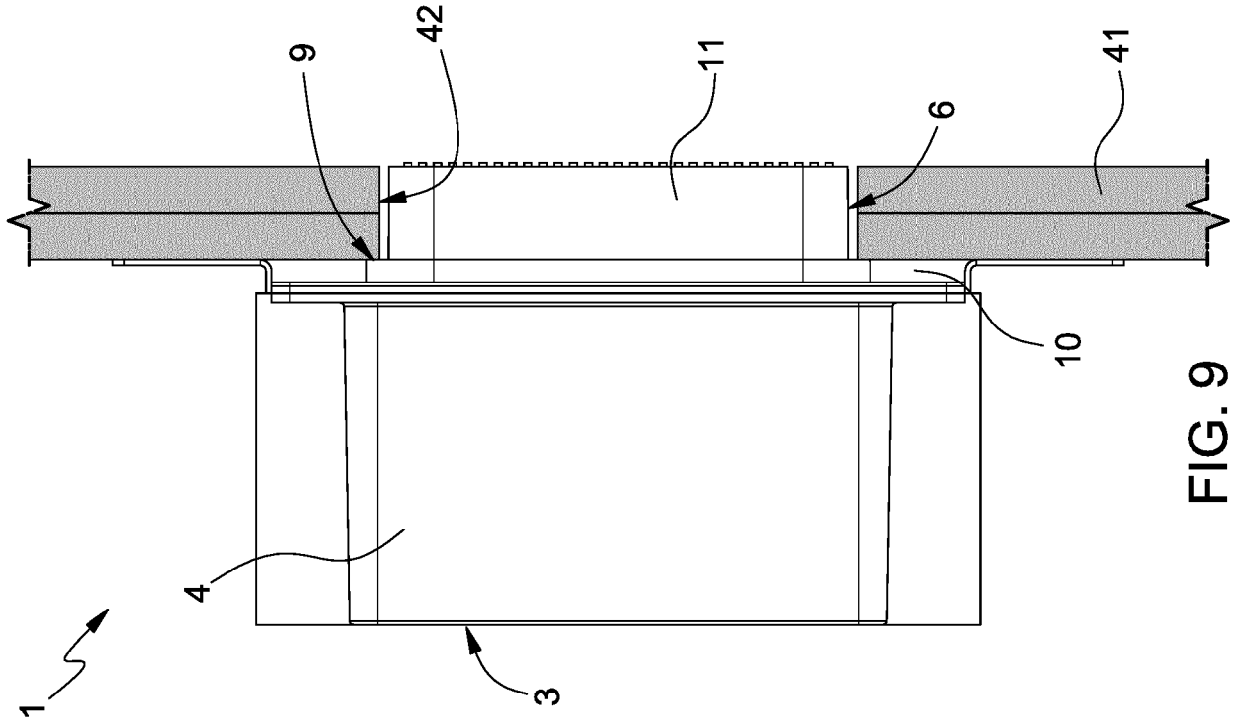

FIG. 9

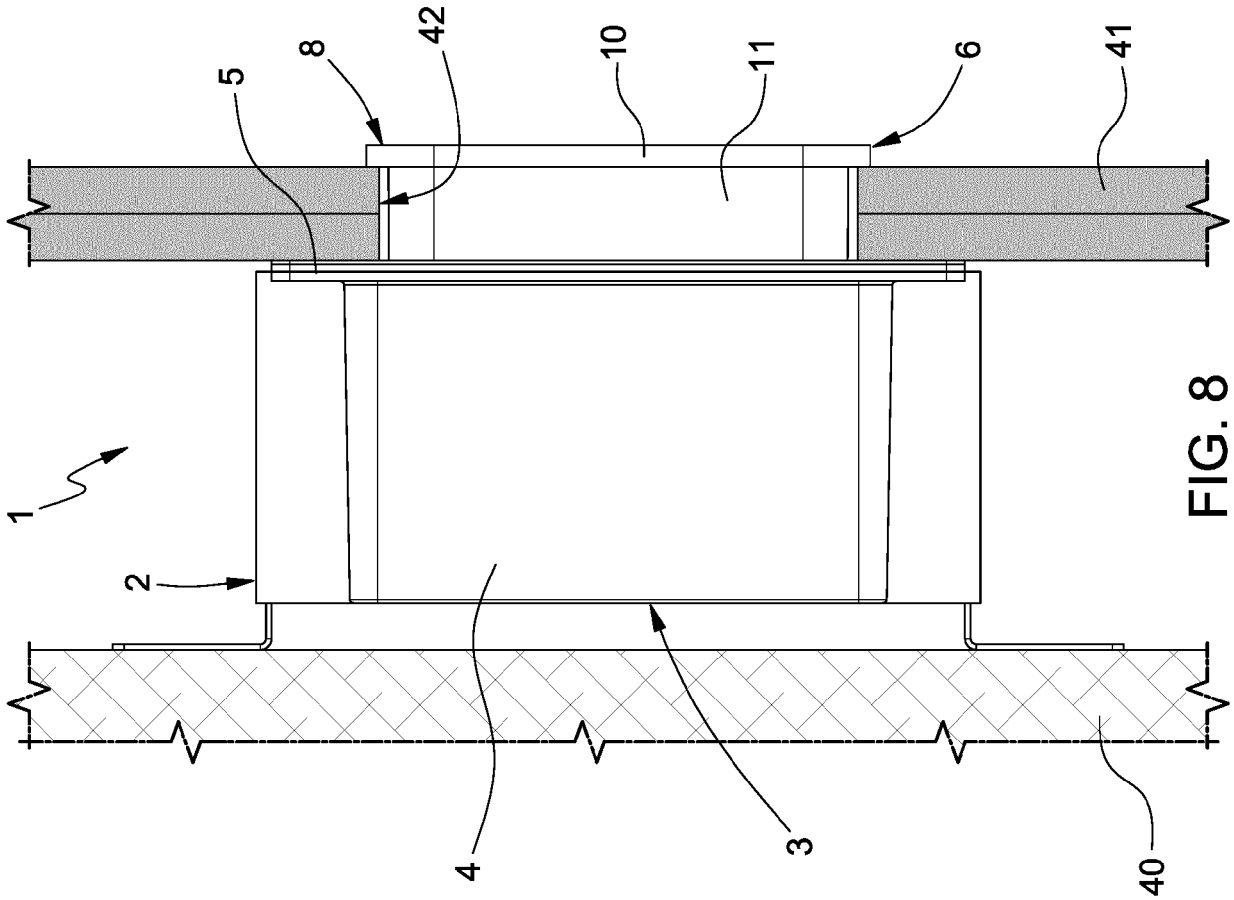

FIG. 8

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EUROPEAN SEARCH REPORT

Application Number
EP 22 21 5884

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	US 6 817 942 B1 (BETZ RICHARD L [US]) 16 November 2004 (2004-11-16) * figure 5 *	1	
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TECHNICAL FIELDS SEARCHED (IPC)
F24F
E04B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	8 March 2023	Blot, Pierre-Edouard

CATEGORY OF CITED DOCUMENTS

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Patent documents cited in the description

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