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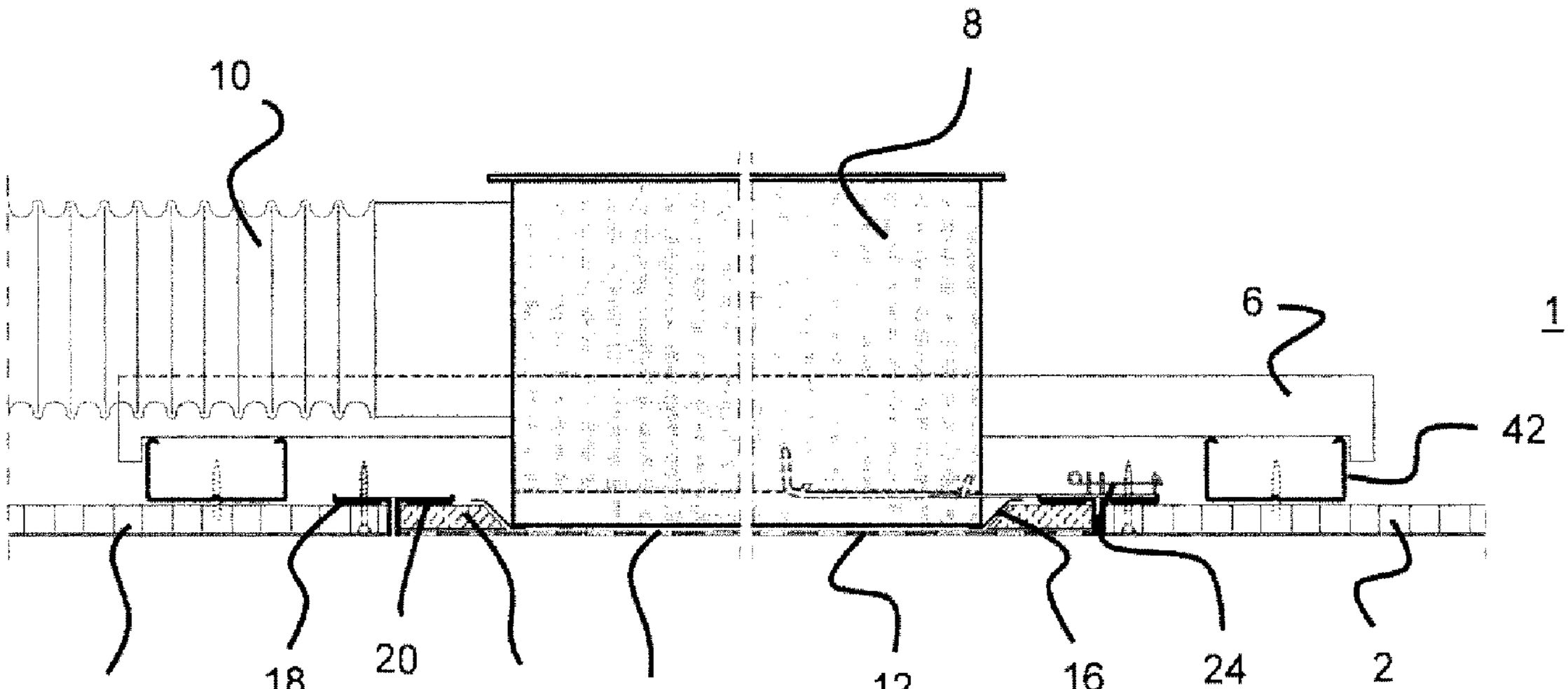
Fig. 3



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Air outlet for a ventilation device, the ventilation device comprising at least an air outlet, an air supply means, and an air guiding device, wherein the air outlet includes a plate having air outlet openings, and wherein the air outlet is in the installed state foldably mounted to an interior paneling such that it can be folded out of the interior paneling to allow for accessing a space there-behind.

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(54) Title: AIR OUTLET FOR A VENTILATION DEVICE

Fig. 3

(57) Abstract: Air outlet for a ventilation device, the ventilation device comprising at least an air outlet, an air supply means, and an air guiding device, wherein the air outlet includes a plate having air outlet openings, and wherein the air outlet is in the installed state foldably mounted to an interior paneling such that it can be folded out of the interior paneling to allow for accessing a space there-behind.

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Air outlet for a ventilation device

The invention relates to an air outlet for a ventilation device and a drywall ceiling with an air outlet for a ventilation device. In particular, the invention relates to an air outlet which is integrated into an interior paneling (i.e. an interior drywall paneling).

In prior art ventilation devices for the ventilation and air conditioning of rooms are known. They serve to air conditioning or temperature control of rooms, that is, the supply of air, wherein the air is conditioned, i.e. heated, cooled, dried and/or humidified.

Ventilation devices generally comprise at least an air supply means, an air guiding device and an air outlet. The air guiding device is used to control the direction of air streams discharged from the ventilation device to achieve a favorable climate of the air flow. The ventilation should be carried out without perceptible air streams. When the air is cooled, it should be prevented that it drops vertically downwards from an air outlet located in the ceiling of the room and produces an unpleasantly strong stream of cool air.

To avoid this, in case of elevated air outlets, the out-coming air streams are distributed in their flow direction so that they flow along the ceiling in the respective direction of the room. The so-called Coanda effect is utilized. To achieve this in ceiling outlets, a flat out-flow of air from the ceiling outlet is imperative.

The outflow angle of the air flow is affected by several components of the ventilation device. The air is supplied to the outlet means in a stream feed direction and must

thereafter usually be deflected in order to flow through an air outlet opening into the room to be ventilated. This often occurs in a deflection and/or impact chamber.

In order to enable a precise and flexible control of the discharged air stream, the outlet device can be provided with additional air guide elements. The air guide elements can be arranged to be movable to allow the user an individual adjustment of the direction and/or strength of the discharged air stream.

Another element of a ventilation device is the air passage. The air passage is essentially the cover for the underlying ventilation device. So it visibly dominates the appearance of the ventilation device for the end user. However, this cover plate also affects the direction and flow behavior of the discharged air. This can be used for the air guidance. On the other hand, the design can also be construed such that the cover plate, referred to hereinafter as air outlet, has minimal influence on the exiting air flow. For this reason, air outlets in the prior art often are lattice plates, thin perforated plates or thin slit plates in painted metal or sheet metal.

The design of the visible air outlets is substantially determined by the function and does often is not appealing to the viewer. Moreover, the ventilation devices with their air outlets form foreign objects in an otherwise homogeneous overall architectural appearance of a ceiling or a wall. There is therefore a need for air outlets that blend into the environment in which they are installed so that they visually interfere minimally with the overall architectural appearance. However, the functionality of the air passage should not be impaired, particularly when it is an air outlet.

This problem is particularly pronounced in ventilation devices that are inserted into suspended interior drywall panelings. Although the construction of drywall panels (i.e. gypsum plasterboards) mounted to carrier profiles provides a space between the wall or raw ceiling and the drywall panel. This space can be used to accommodate the non-visible parts of the ventilation device. The relatively large thickness of the drywall panels,

however, means that an air outlet, which is made of a thin plate does not finish flush with the outer edge of the drywall panels.

If drywall panels made of gypsum plasterboards are used as drywall elements, these typically have a thickness of about 12.5 mm, while air passages known in the prior art are often only a few millimeters thick metal plates.

Plasterboards have the advantage that they allow for other functionalities apart from the covering and dividing of spaces. With perforated gypsum plasterboards for example, acoustic noise reducing rooms can be built. There exist perforated gypsum boards with different hole or slot designs. There is a need for air passages that adapt these designs as much as possible, so that the overall architectural picture is not affected by it.

It is generally possible to use the holes or perforations in the perforated gypsum plasterboards for air passage. In this way, the air outlets would not differ from the rest of the ceiling look. However, the relatively large thickness of the gypsum board prevents flat angular outflow of air so that this solution provides only insufficient comfort for the consumer.

There are further disadvantages by combining drywall constructions with ventilation systems: Currently, ventilation systems are not part of the drywall construction systems. This means that the ventilation device is installed after completion of the drywall construction and often is installed by damaging the ready build drywall construction. By separate planning and different focuses of interest of the manufacturer of drywall constructions on the one side and of ventilation systems of the other side can barely meet actual on-site requirements, such as low suspension height of the ceiling.

Conventional ceiling passages are retrofitted in the drywall ceiling. Since the manufacturer of drywall constructions and ventilation systems do not understand each other respectively, the previously known design solutions are not very appealing. As a

rule outlet openings are made of painted sheet metal. This means that the passages despite all the production quality are always optically present and interfere with the design of the drywall ceiling.

The object of the invention is therefore to provide an air passage and an air outlet for ventilation devices, which allows easy installation and easy maintenance of ventilation systems. The air outlets are to be used particularly in drywall construction and can be visually fit into the interior design.

The problem is solved by an air outlet with the features of claim 1 and a drywall ceiling with the features of claim 12. Advantageous embodiments are defined by their features normed in the dependent claims.

An air outlet for a ventilation device according to the invention comprises a plate with a plurality of air outlet openings, the air outlet being fixed in a manner so that when installed in an interior paneling it is foldable out of the interior paneling to make a space behind accessible. Apart from at least one air outlet, the ventilation device comprises an air supply means and an air guiding device.

The construction of the air outlet which is foldable out of the interior paneling has the advantage that a drywall construction for the interior can be completed with an opening for a ventilation device by a professional (expert in building of drywalls) for drywall constructions. Subsequently, an installation of the ventilation device by a professional for ventilation is easily possible through the opening in the interior paneling. The professional for ventilation has not to initially form an appropriate opening (usually with little professionalism) in the drywall construction, but finds that work already done by the expert for drywall constructions. After the installation of the ventilation device, the opening may be releasably blinded by a customized or standardized air outlet produced by drywall manufacturer. This ensures a clean and straight design of the interior paneling made from one hand, wherein site requirements can be easily met.

Additionally, at a later time maintenance of the ventilation device can be performed by release of the air outlet via simply folding it out from the interior paneling.

An interior paneling according to this invention is understood to mean inter alia a drywall ceiling and/or a drywall construction wall, i.e. a separation drywall. The phrase air passage comprises air outlets and air inlets. By air outlets air flows out of a ventilation device into a room while room air flows from the room into a ventilation device through air inlets. The invention is described below by reference to air outlets, because here, apart from the function to supply air to a room, other functions are necessary. With air inlets this is not the case to the same degree. Of course, the invention can therefore also be used as air inlet.

According to a particularly preferred aspect, the plate of the air outlet comprises a cover frame, which at least partially covers the air outlet openings of the plate. Particularly preferably, the cover frame is arranged so that it seals the air outlet openings disposed laterally from the ventilation device which are not covered by the ventilation device arranged at the plate. In this way, the air outlet can be made larger than necessary, e.g. greater than the ventilation device. This ensures sufficient space for the installation of the ventilation device, but also provides space for future maintenance.

The cover frame serves to seal the air outlet openings which are not necessary for the ventilation against the back flow of air into the space between the ceiling or wall and the interior paneling. This is especially useful if an extremely flat outflow has to be realized. An extremely flat outflow angle is an angle between the ceiling or wall and the flow direction of the air stream of less than 25°, preferably less than 15°. The angle has to be sufficiently small such that the Coanda Effect is effected, meaning that the air flow is attracted by the ceiling and flows along the ceiling far into the room.

The cover frame can preferably be designed in the manner of a closed frame so as to border the ventilation device on all sides. In this way, the air outlet openings provided for the ventilation device may be, for example, centrally arranged in the plate and are symmetrically enclosed by the closed frame like a visor.

If the cover frame is disposed on the side of the plate facing the ventilation device, the side of the plate visible to the viewer can be designed freely, without the visually disturbing cover frame. It is also possible to arrange the cover frame as a design element on the side of the plate visible to the viewer.

If the cover frame is disposed on the side facing the ventilation device of the plate, it may be advantageous to at least provide the portions of the cover frame visible through the air ventilation openings of the plate in a dark color such as black, so that they do not visually differ from the other regions of the perforated plate and/or the interior paneling.

The cover frame can advantageously be connected to the plate at the edges of the plate. If the plate is provided, for example, with a cover frame, an attachment to this frame can be easily realized without the visible surface of the plate being visually impaired.

According to a particularly preferred aspect of the invention, the frame has a chamfer towards the ventilation device. The chamfer can be a 45° chamfer. The chamfer is used to laterally align the ventilation device, the frame and the air outlet openings of the plate. Since the plate is fixed to the frame and is essentially non-slidable integrated into the interior paneling, an alignment must be done by moving the ventilation device. Since the ventilation device rests only on support beams of the interior paneling and is not fixed any further, such a displacement is possible without any effort.

The outer edges of the ventilation device are seated on the plate of the air outlet. It is optically advantageous, if the edges of the ventilation device are seated on web portions

of the plate without or at least with only with a minimum overlap with the air-outlet openings. For this purpose, an alignment of the ventilation device to the plate is necessary. If the outer edges of the ventilation device overlap with air-outlet openings visibility from below is not ruled out.

Now, if the ventilation device comprises a chamfer at the contact edges which are in contact to the chamfer of the cover frame, an easy alignment of the ventilation device relative to the cover frame is possible via the mutually complementary sliding chamfer edges.

The cover frame can be made from different materials, such as wood, aluminum, sheet steel, or plastic. Further, the cover frame may be of a solid material or be also a one piece profile. Preferably, a U-shaped sheet steel profile is used.

In order to enable a simple, stable and durable attachment of the air outlet in the interior paneling, the air outlet can be equipped with a mounting frame device. The mounting frame device is preferably in two parts and includes an outer mounting frame and an inner mounting frame. The outer mounting frame is secured to the interior paneling and the inner mounting frame is fixed to the plate of the air outlet. Preferably, both mounting frames respectively are formed circumferentially and include at least partly the edges of the plate or the opening in the interior paneling.

The plate of the air outlet may have a lower thickness than the elements (drywall panels) of the interior (drywall) paneling. The thickness difference can be compensated by a spacer so that the bottom edge of the plate in a locked state is flush with the lower edge of the surrounding interior paneling. Thus, a uniform mounting on common or different but identical support elements is possible.

Such a flush installation of the visible surface of the interior paneling can nevertheless be achieved when different materials in different thicknesses are used. As an example,

gypsum boards with a thickness of 12.5 mm for the interior paneling may be mentioned, which can be combined with a 1.5 mm thick plate to optimize the air outlet, without a ledge being created on the visible side or complicated assembly adjustments must be made.

The thickness of the plate of the air outlet can also be adjusted via the thickness of the cover frame to the thickness of the interior paneling, as the cover frame is preferably secured to the inner mounting frame of the mounting device.

The thickness of the plate of the air outlet is preferably less than 3 mm, particularly preferably less than 2 mm and in particular less than or equal to 1.5 mm. A small thickness of the plate has only a minimal effect on the air guidance. Depending on the material used for the plate and the dimensions of the plate, different thicknesses of the plate are necessary for a sufficient stability. The plate should be made as thin as possible.

To be able to fold out the air outlet from the interior paneling, the use of a hinge or hinge system is provided. Preferably, hinges or hinge joint components can be arranged on the plate of the air outlet. For example, opposite small bolts can be provided that can be rotatably supported in pans in the interior paneling so that the plate can be rotated or pivoted about an axis.

In addition, the plate advantageously comprises at least parts of a releasable locking device by which it can be detachably fixed to the interior paneling. Particularly preferred is a locking means which is released by pressure on the plate (i.e. particular portions of the plate) of the air outlet and which is based for example on a spring system. Such locking systems based on springs are especially preferred because they do not optically impair the visible side of the interior paneling including the air outlet. Basically, other locking systems can also be used, for example electronically controlled devices.

In order to achieve a homogeneous or uniform visual appearance of an interior paneling, the plate can have the same design as the interior paneling that is visible to a viewer so that the plate is visually indistinguishable from the surrounding interior paneling and seamlessly fits into this surrounding with respect to the designs and also the materials preferably used. This can for example be achieved by covering the visible side with gypsum plasterboard cardboard or with a lining, analogous to the surface, for example of gypsum plasterboards. The plasterboard liner or the lining can then be further treated in the same manner as the elements of the interior panel, for example, as the gypsum plasterboards. They can, for example, be coated with a primer and with an interior paint, preferably by roller application.

In addition to the air outlet for a ventilation device, the invention also relates to a drywall ceiling comprising a supporting structure of a plurality of metal profiles, an interior paneling mounted on the metal profiles, and at least one ventilation device comprising at least one air supply, an air guiding device and an air outlet. The air outlet comprises a plate with air outlet openings. The air outlet is mounted such that, in the installed state in an interior paneling, it is foldable out of the interior paneling to make accessible a space behind.

More preferably, the interior paneling is made of gypsum plasterboards, especially of perforated gypsum plasterboards, so-called acoustic panels. Perforated gypsum plasterboards are widely used as building material for sound absorption and are particularly interesting because they already have a perforation pattern. The perforation pattern of the plate of the air outlet can be adapted to the perforation pattern in the perforated gypsum panels, so that the pattern visually continues without perceptible interruption, i.e. with respect to size, spacing and/or material. The air outlet openings of the plate of the air outlet then have the same design as the perforation pattern of the perforated gypsum plaster panels and extend this pattern further. They can, for example, be round or square, and arranged in a regular or irregular pattern.

This means that the pattern continues without interruptions (except for unavoidable structural interruptions) with the same distance between adjacent holes at the transition from the perforated gypsum plasterboard to the air outlet openings in the plate of the air outlet. The distance between adjacent holes in the plate and adjacent perforations in the perforated plasterboard and the plate is the same. In other words, this means that the distance of the center point of the last opening in front of the edge rim to the edge rim of the plate is half as large as the distance between the center points of adjacent openings of the perforation pattern. If the perforations of the gypsum plasterboard and the openings of the plate are arranged side by side, a uniform spacing results.

In the following the invention will be explained in more detail with reference to drawings. Like reference numerals denote similar features throughout the drawings.

Fig. 1: Top view on a drywall ceiling with a ventilation device

Fig. 2: Bottom view on a drywall ceiling with a ventilation device

Fig. 3: Cross sectional view through a drywall ceiling with a ventilation device

Fig. 4: Cross sectional view through a drywall ceiling with air outlet without a ventilation device

Fig. 5: Enlarged cross sectional view of Fig. 4

Figure 1 illustrates the construction of an embodiment of a drywall ceiling 1 according to the invention with a built-in ventilation device in a top view, looking from the ceiling towards the floor. The drywall ceiling 1 is mounted in the manner of a suspended ceiling. A plurality of base profiles 41 are attached to the raw ceiling. At right angles to these base profiles 41 carrier profiles 42 are mounted on the base profiles 41, which in turn constitute the framework to which the building panels 2, here perforated gypsum

plasterboards 2, are mounted. The perforated gypsum plasterboards are covered from above with a lining, in this case a black fleece laid on top thereof. For this reason, in the plan view of Fig. 1, the holes 21 of the perforated gypsum plasterboard 2 are not visible.

The perforated gypsum plasterboard 2 has an opening (not shown) through which the ventilation device 8 was inserted. In this example the ventilation device 8 comprises a diffuser. The diffuser 8 is equipped with beams 6 and has support on two supporting profiles 42. It can be moved freely on the support profiles 42 and is not fixed any further.

The opening of the perforated gypsum board 2 is sealed with an air outlet 3. In Fig. 1, only the outer edges of the air outlet 3 can be seen because the diffuser 8 covers the central part of the air outlet 3. The air outlet 3 has a plate with air openings, in this case a 600 x 600 mm large, 1.5 mm thick perforated plate 12 (not shown), that is circumferentially surrounded at its edges by an inner mounting frame 20. The inner mounting frame is an aluminum profile.

To the inner mounting frame 20 hinges 22 are mounted by means of which the air outlet 3 can be folded out around a common axis from the drywall ceiling. At the edges, arranged opposite with respect to the joints 22, a spring mechanism 24 is arranged, which fixes the air outlet 3 in the opening of the perforated gypsum plasterboard 2. The locking mechanism can be released by pressing the underside of the air outlet 3. To avoid a sudden falling out of the air outlet 3 from the opening of the perforated gypsum plasterboard 2, a catching hook 28 is also provided therein, which holds the air outlet 3 after its release in a semi-open position.

Figure 2 shows the same section of a drywall ceiling 1 as shown in Fig. 1, but this time in the bottom view, i.e. from the perspective of an observer looking from floor to ceiling. In this view, the perforation 21 of the perforated gypsum plasterboard 2 with the black fleece is visible (black squares). It will also be appreciated that in the perforated plate 12 the air outlet 3 does not optically differ from the perforated gypsum plasterboard 2 into

which it is fitted. Simply due to their construction the abutting edges of the perforations in the perforated gypsum plasterboard 2 and the air outlet opening 3 of the plate are to be recognized.

In order to achieve the visual unity between perforated gypsum plasterboard 2 and the holes in the plate 12, the plate 12 with the openings was covered (glued) on the visible side with a plasterboard liner, comprising corresponding openings to the openings in the plate 12. The plasterboard liner of the plate 12 was then primed and painted with the same paint as the surrounding perforated gypsum plasterboard.

Thus, the surfaces of the visible sides of the perforated gypsum plasterboard 2 and the plate with openings 12 are of the same material (gypsum plasterboard liner), which was further treated in the same manner (primer, paint). The pattern of the perforated gypsum plasterboard 2 and of the plate with openings 2 is identical in shape, size and spacing. The pattern is continuous as well as consistent. The designs of the perforated gypsum plasterboard and of the air outlet do not differ in any way.

Figure 3 shows a cross sectional view of the drywall ceiling 1. In this representation, the arrangement of the ventilation device 8 with the air supply 10 on the plate with openings 12 of the air outlet 3 is depicted. At the side facing away from the viewer of the dry ceiling, a cover frame 14 is arranged in a manner surrounding the air outlet openings 13 of the plate 12. The frame is painted black on its underside pointing to the viewer (not shown) such that it is not visually different from the black fleece applied to the perforated gypsum plasterboard when seen through the plate openings 12. The cover frame 14 is made of a sheet steel profile and has the outer dimensions of 598 x 598, a frame width of 45 mm and a thickness of 12 mm.

The cover frame 14 is fixed to the inner mounting frame 20 of the mounting frame device 18, 20 and laterally seals the air outlet openings of the air outlet. The peripheral inner edge of the cover frame 14 pointing to the diffuser has a 45° chamfer. Form-locking

thereto, the diffuser 8 has on its lower edge a peripheral chamfered portion 16 which is formed in this embodiment by an angle plate mounted at the lower edge of the diffuser 8. Via the mating 45° chamfers of the cover frame 14 and the diffuser 8, the diffuser 8 can be aligned on the support profiles 42 matching the air outlet 3 by simply moving the beams 6.

In Fig. 4 the same drywall ceiling 1 is shown in cross-section for better clarity again, but this time without a built-in ventilation device. The air outlet 3 is in the locked state.

Fig. 5 shows an enlarged view of Fig. 4. In this expansion, the arrangement of the mounting frame device which comprises the outer mounting frame 18 and inner mounting frame 20, is clearly visible. Both, the outer mounting frame 18 and the inner mounting frame 20, are composed of a circumferential running aluminum profile. By means of the inner frame 20, the cover frame 14 is fixed to the plate with openings 12. The cover frame 14 compensates for the difference in thickness between the perforated gypsum plasterboard 2 and the plate with the openings 12 so that the elements "perforated gypsum plasterboard" 2 and "air outlet" 3 are equally thick.

The distance a between adjacent perforations 21 in the perforated gypsum plasterboard is the same size as the distance b between openings 21 at the transition from the perforated gypsum plasterboard 2 to the air outlet openings 13 in the perforated plate 12. The dashed lines indicate the position of the cylinder axes of the holes in the perforated gypsum plasterboard or the air outlet openings 13 in the perforated plate.

Reference numeral list

1	drywall ceiling
2	building panel
21	perforation in the building panel
3	air outlet
41	base profile
42	carrier profile
6	beam to support ventilation device
8	ventilation device (diffusor)
10	air supply
12	metal sheet with openings
13	air outlet openings
14	cover frame
16	chamfered section of the ventilation device
18	outer mounting frame
20	inner mounting frame
22	hinge
24	spring mechanism
26	spacer
28	catching hook

Claims

1. Air outlet for a ventilation device, the ventilation device comprising at least an air outlet, an air supply means, and an air guiding device, wherein the air outlet includes a plate having air outlet openings, and wherein the air outlet is in the installed state foldably mounted to an interior paneling such that it can be folded out of the interior paneling to allow for accessing a space there-behind.

2. Air outlet according to claim 1, wherein the interior paneling is a drywall ceiling or a drywall wall.

3. Air outlet according to claim 1 or 2, wherein the plate has a cover frame which at least partially covers the air outlet openings.

4. Air outlet according to claim 3, wherein the cover frame is arranged so that it seals air outlet openings laterally disposed of the ventilation device.

5. Air outlet according to claim 3 or 4, wherein the cover frame is arranged in a manner of a closed frame on the plate.

6. Air outlet according to any one of the claims 3 to 5, wherein the cover frame is arranged on the side of the plate that faces the ventilation device.

7. Air outlet according to any one of the claims 3 to 6, wherein the cover frame comprises a chamfer, preferably a 45 ° chamfer, arranged at the edge facing the ventilation device.

8. Air outlet according to any one of the preceding claims, wherein the plate has a thickness less than the surrounding interior paneling, wherein the thickness difference between the plate and interior paneling is balanced by a spacer so that in a locked state the lower edge of the plate is flush with the lower edge of the surrounding interior paneling.

9. Air outlet according to any one of the preceding claims, wherein the plate has a releasable locking device by means of which it is releasably secured to the interior paneling.

10. Air outlet according to any one of the preceding claims, wherein a side of the plate visible to a viewer has the same design as compared to the interior paneling, so that plate does not visually differ with respect to the design and fits seamlessly into the surrounding interior paneling.

11. Air outlet according to any one of the preceding claims, wherein the plate is covered on the side visible to the viewer with plasterboard liner or with a fleece, and wherein said plasterboard liner or fleece can be primed and treated with a paint.

12. Drywall ceiling comprising a substructure of a plurality of metal profiles, an interior paneling mounted on the metal profiles and at least one ventilation device comprising at least one air supply means, an air guiding device and an air outlet, wherein the air outlet is in the installed state foldably mounted to an interior paneling such that it can be folded out of the interior paneling to allow for accessing a space there-behind.

13. Drywall ceiling according to claim 12, wherein the interior paneling comprises plasterboards, in particular perforated gypsum plasterboards.

14. Drywall ceiling according to claim 13, wherein the perforated gypsum plasterboard has a perforation pattern, and wherein the air outlet openings of the plate have the same pattern as the perforation pattern of the perforated gypsum plasterboard and extend the perforation pattern of the perforated gypsum plasterboard.

15. Drywall ceiling according to claim 14, wherein the distance between perforations at the transition from the perforated gypsum plasterboard board to the air outlet openings in the plate is the same as compared to the distance between adjacent perforations in the perforated gypsum plasterboard.

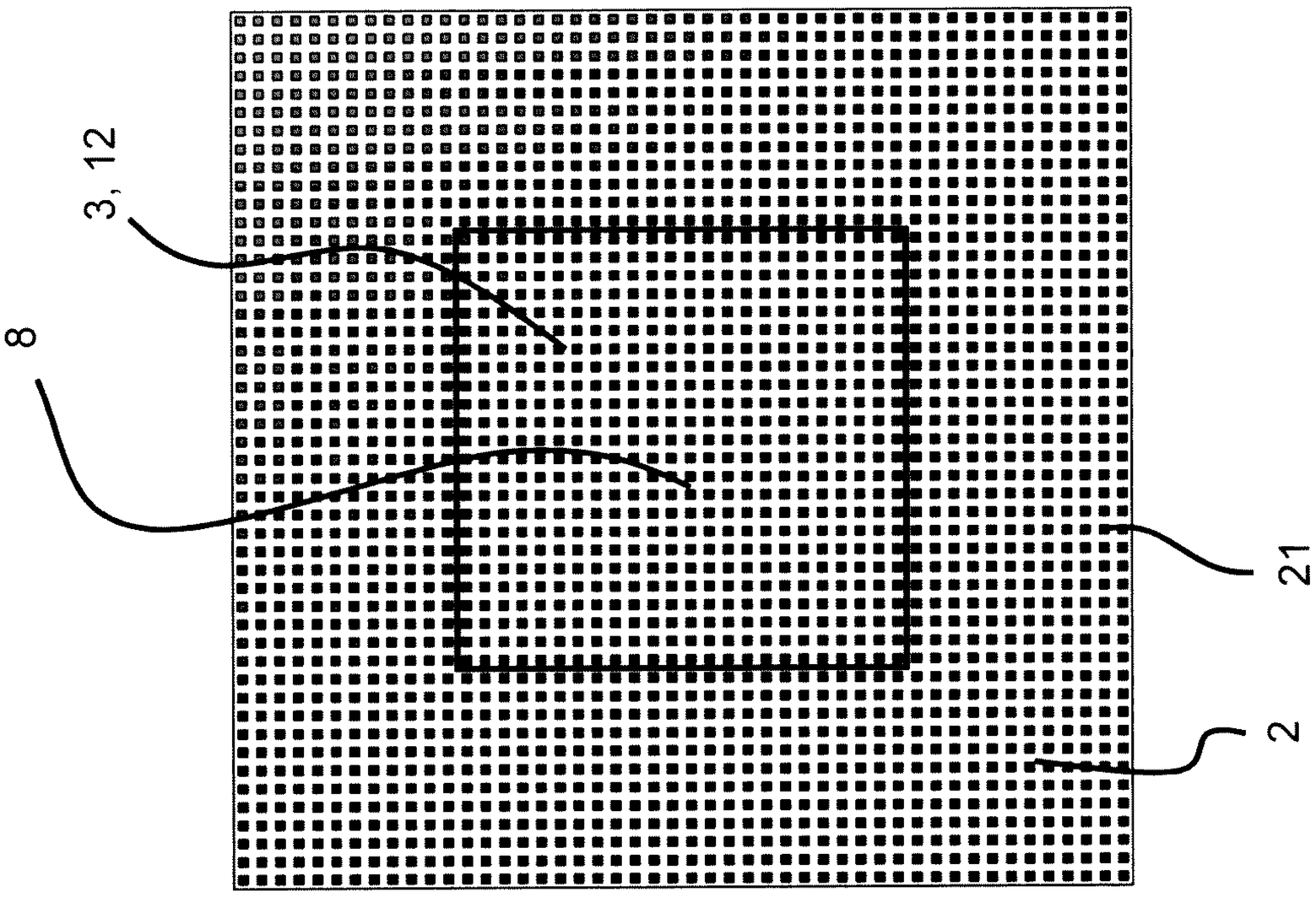

Fig. 2

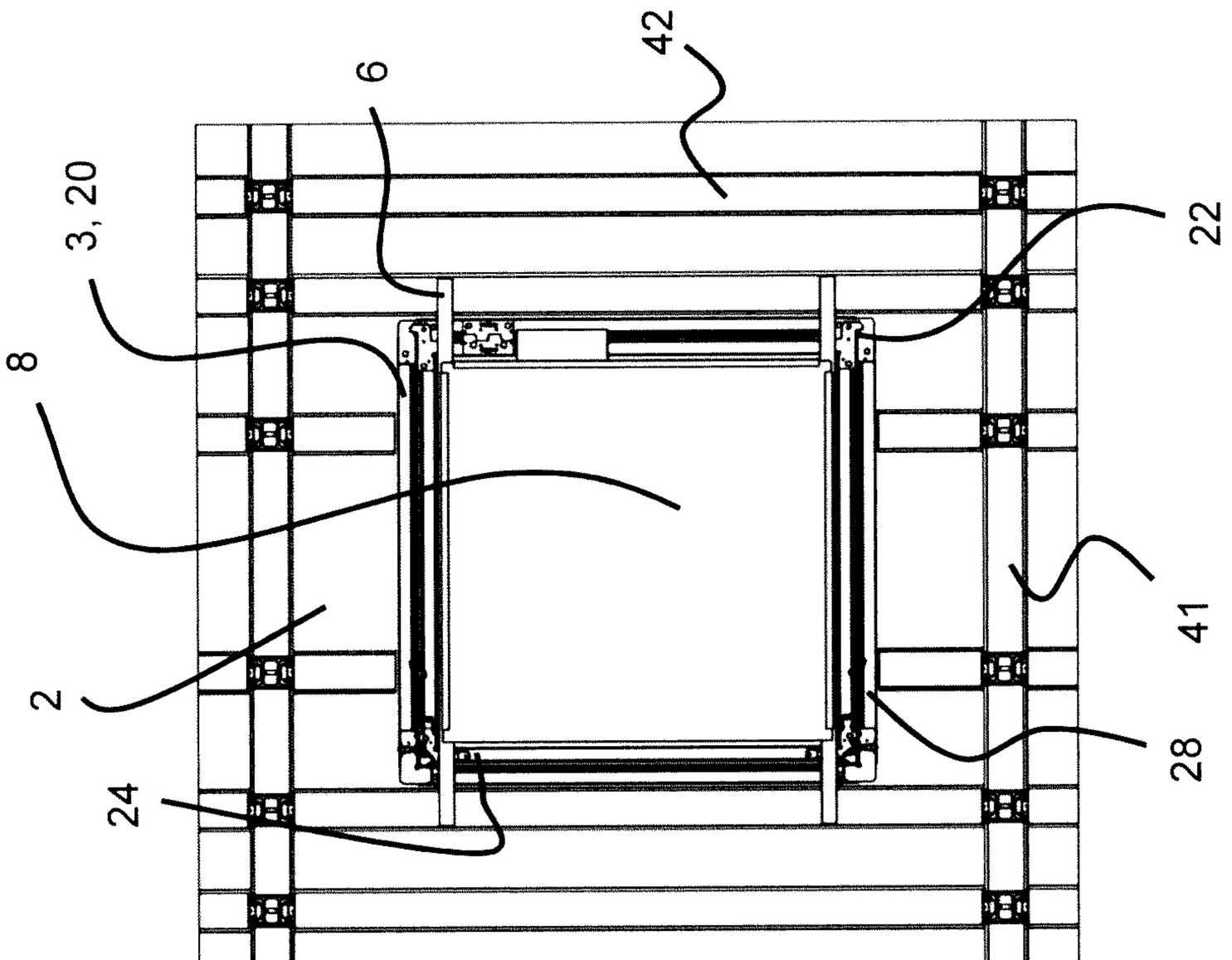

Fig. 1

Fig. 3

Fig. 4

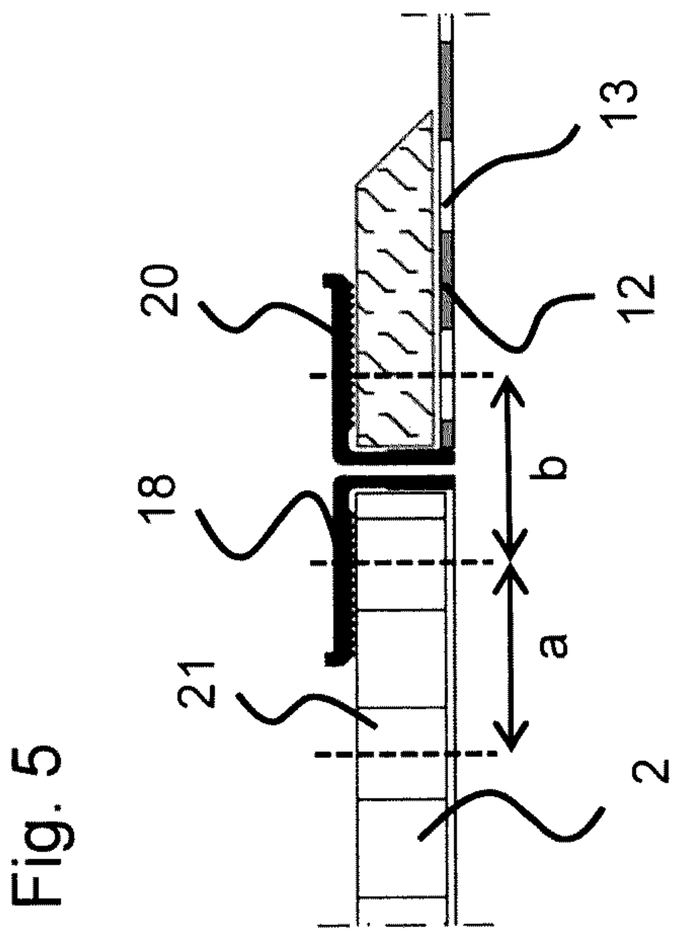

Fig. 5

Fig. 3