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(54) IMPROVED METHOD FOR MANUFACTURING VENTILATION GRILLES

(57) The present invention relates to a method for manufacturing frames for ventilation grilles and the ventilation grilles themselves, a frame and ventilation grille thus manufactured, and the use of the frames for manufacturing ventilation grilles.

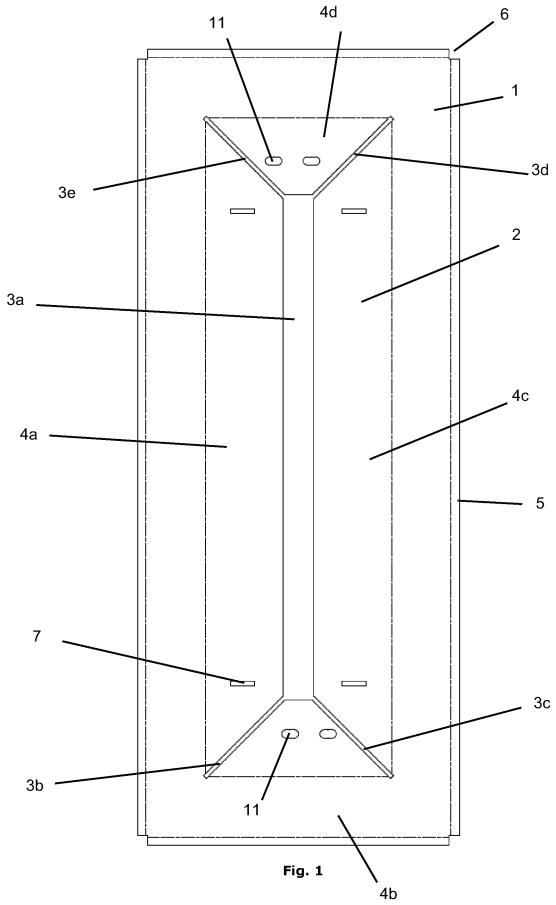

Fig. 1

EP 4 382 224 A1

Description

TECHNICAL FIELD

[0001] The invention relates to an improved method for manufacturing frames for a ventilation grille, as well as a frame for a ventilation grille manufactured according to the improved method, and the use of the frame manufactured according to the method in a ventilation grille.

PRIOR ART

[0002] Existing methods for manufacturing frames for ventilation grilles make use of profile pieces, which are manufactured (mitered), and assembled by joining them together, where a large number of techniques exist for connecting them. These techniques include, among other things, lap joints where the profiles are connected via welding or mechanical anchoring such as screws, but in particular, a miter joint is often used, where a connecting segment is provided at the rear and is anchored on both profiles. Such a miter joint has the advantage that it is aesthetically more appealing than the lap joints.

[0003] However, all these joints always result in visible seams, and also require additional steps in production, which require extra material, and also cost extra time. Each of these three aspects is undesirable, and the present invention seeks to solve these problems by approaching the production process from a different angle.

[0004] FR 1 392 684 describes a ventilation grille and tools for its manufacture. The document pertains to a ventilation grille of the type consisting of a mounting bracket that needs to be sealed in an opening in a wall, and a grille itself that is removably attached to the bracket.

[0005] The present invention aims to find a solution for at least some of the above problems.

[0006] There is a need for an improved method that allows for a faster production process, with fewer separate steps, and that results in an aesthetically more attractive final product (frame).

SUMMARY OF THE INVENTION

[0007] In a first aspect, the invention relates to a method for manufacturing a frame for ventilation grilles according to the first claim.

[0008] In a second aspect, the invention relates to a frame for ventilation grilles manufactured according to the method of the first aspect.

[0009] In a third aspect, the invention relates to the use of a frame according to the second aspect, for the manufacture of a ventilation grille.

DESCRIPTION OF THE FIGURES

[0010]

Figure 1 shows a top view of the sheet for manufacturing the frame after the step of providing the cuts, according to a possible embodiment.

Figure 2 shows a side view of the folded frame of the embodiment according to Figure 1.

Figure 3 shows a front view of a possible embodiment of a support beam for the invention.

Figure 4 a side view of the support beam of the embodiment according to Figure 3.

Figure 5 a detailed view of the receiving cuts of the embodiment according to Figure 3.

Figure 6 shows a top view of a ventilation grille, provided with a frame according to an embodiment of the invention according to Figures 1-2, with two support beams according to Figures 3-5, and a plurality of slats.

DETAILED DESCRIPTION OF THE INVENTION

[0011] Unless otherwise defined, all terms used in the description of the invention, including technical and scientific terms, have the meaning as commonly understood by a person skilled in the art to which the invention pertains. For a better understanding of the description of the invention, the following terms are explained explicitly.

[0012] In this document, "a" and "the" refer to both the singular and the plural, unless the context presupposes otherwise. For example, "a segment" means one or more segments.

[0013] When the term "around" or "about" is used in this document with a measurable quantity, a parameter, a duration or moment, and the like, then variations are meant of approx. 20% or less, preferably approx. 10% or less, more preferably approx. 5% or less, even more preferably approx. 1% or less, and even more preferably approx. 0.1% or less than and of the quoted value, insofar as such variations are applicable in the described invention. However, it must be understood that the value of a quantity used where the term "about" or "around" is used, is itself specifically disclosed.

[0014] The terms "comprise," "comprising," "consist of," "consisting of," "provided with," "have," "having," "include," "including," "contain," "containing" are synonyms and are inclusive or open terms that indicate the presence of what follows, and which do not exclude or prevent the presence of other components, characteristics, elements, members, steps, as known from or disclosed in the prior art.

[0015] The term "ventilation grille" is used to denote flat grilles suitable for installation in walls such as sidewalls, ceilings, floors, or other surfaces (false walls, panels, etc.), and comprises, among others, wall grilles. It should be noted that wall grilles do not have specific requirements regarding the location where they are mount-

ed (as mentioned, walls, ceilings, floors, and other surfaces). Preferably, the ventilation grilles as described herein are wall grilles.

[0016] Quoting numerical intervals by endpoints comprises all integers, fractions and/or real numbers between the endpoints, these endpoints included.

[0017] The invention relates, in a first aspect, to a method for manufacturing frames for ventilation grilles, wherein the frame comprises a polygonal, preferably substantially rectangular, opening, comprising the following steps:

a. providing a metal sheet;
b. the application of internal cuts through the sheet, wherein the cuts define a circumscribed polygon that pertains to the opening of the frame, and wherein the cuts define multiple sections that extend from each of the sides of the circumscribed polygon inwardly into the circumscribed polygon;
c. folding the sections towards a first side of the metal sheet over the side from which the sections extend, to an angle of at least 60°, preferably at least 75°, and most preferably about 90°, relative to the metal sheet.

[0018] As previously indicated, in the prior art, a frame is constructed from separate profile pieces, which are first produced, and in a subsequent phase assembled, often at a different location. This allows for a certain modularity in the construction, but on the other hand, it results in a great deal of unnecessary actions, which are detrimental in terms of production materials, raw materials, and production time. In addition, the visible seam between the profile pieces is undesirable and can even be disadvantageous because dust or dirt can accumulate in it, can lead to damage or injuries because these seams often have sharp edges, and there is the additional requirement that the profile pieces to be joined fit together very well, as variations lead to gaps, misalignments, and this can even lead to deviations that cause problems in other places, for example with very precise customization. Finally, by working with a frame made of a single piece, as opposed to assembled profile frames, the risk of mechanical failure is virtually reduced to 0.

[0019] It is clear that the above method, where the frame is made of and manufactured from a single piece, solves each of the problems. In this method, it is possible to very easily customize each frame, as one only needs to start with a piece of sheet material that is large enough, and the necessary cuts can be made in a single operation, and in a second operation, these can be folded.

[0020] In most cases, the opening is rectangular with a long and a short side, although polygonal openings can also be provided in certain variations. During cutting, a central cut is made, from which further cuts extend to the sides or corners of the opening. In this manner, the perimeter of the opening is defined as the circumscribed polygon around the cuts, effectively forming "flaps" of sheet material relative to the sides of the opening, which can then be folded over the side from which the flap extends. In this way, the folded sections form elements with which the ventilation grille can be anchored in a wall, ceiling, floor, or other surface, for example using screws, bolts, etc. An additional advantage is that typically additional holes need to be provided, which can be easily provided in the (at that time still flat) metal sheet, together with the step of cutting, instead of on an already folded profile piece.

[0021] Typically, a (pre-cut) rectangular metal sheet is used to start with, so there is no loss of material, or a negligible amount of material that is removed from the center of the opening, typically in very large frames. However, such cases often allow for the reuse of the removed pieces for smaller frames.

[0022] The folded sections are preferably folded into a perpendicular position relative to the rest of the metal sheet, as this allows for an easy connection with a wall/ceiling/floor element in practice. Preferably, the radius of curvature of the fold line remains limited, such as a maximum of 1.0 cm, preferably a maximum of 0.5 cm, more preferably a maximum of 0.25 cm, even more preferably a maximum of 0.1 cm or even 0.075 cm. It should be understood that the radius of curvature may also depend in part on the overall dimensions and the precise context in which the ventilation grille would be used.

[0023] In a preferred embodiment, at least one, and preferably each, of the cuts is made by punching (out) sheet material according to the cuts. Alternative or supplementary methods for making one or more, or all, of the cuts include laser cutting, waterjet cutting, plasma cutting, oxy-fuel cutting, drilling, etc.

[0024] In a preferred embodiment, the circumscribed polygon is a circumscribed rectangle. This is the most common design for ventilation grilles, wherein the opening is an elongated rectangle, where the long side is substantially longer than the short side (minimum ratio 2:1, preferably 3:1, more preferably 4:1, etc.).

[0025] In a further preferred embodiment, the cuts comprise four corner cuts, which extend internally from the corner points of the circumscribed rectangle within the circumscribed rectangle, preferably as a line segment at an angle of at least 20° (preferably at least 30°, 35°, or even 40°, and most preferably about 45°) relative to the sides of the circumscribed rectangle. These corner cuts extend towards a central cut that runs parallel to a long side of the circumscribed rectangle and is preferably located in the middle between the two long sides of the circumscribed rectangle. The central cut runs over a shorter distance than the long side, causing the corner cuts to divide the corners of the rectangle into two partial angles.

[0026] In this way, the sections are clearly defined. Additional requirements may be imposed as necessary, for example a minimum distance from the side from which the sections extend, to the free end of the section (where the central cut is provided), or a specific angle for the

corner cuts. For example, by taking an angle between 30° and 60° relative to the sides of the rectangle, the aforementioned minimum distance can easily be increased.

[0027] In this manner, the cuts form a mirrored Y-shape, with the reflection point on the leg of the Y, wherein the shared leg is optionally widened (and here a rectangular piece of sheet is completely cut out, instead of just a cut).

[0028] This embodiment provides sections in the shape of trapezoids, preferably isosceles.

[0029] Due to the typically high ratio between the long and short sides, and a minimum angle of the corner cut relative to the sides of 20° or more, the small base of the trapezium is still substantially long, often more than 75% of the length of the large base, providing ample space for the provision of anchoring points (e.g., openings to allow screws to pass through), but also to accommodate support beams, as discussed further in the application.

[0030] According to an alternative embodiment, the cuts comprise four corner cuts, and wherein the cuts comprise four central cuts, which central cuts define a cut-out rectangle, preferably centered in the circumscribed rectangle. Therein, the corner cuts extend internally within the circumscribed rectangle from the corner points of the circumscribed rectangle, preferably as a line segment at an angle of at least 20° relative to the sides of the circumscribed rectangle, towards the nearest corner point of the cut-out rectangle.

[0031] This amounts to a similar product as in the previous embodiment, wherein a piece of the sheet material is removed, which again results in sections in the shape of trapezoids, preferably isosceles. This embodiment is mainly applicable to large-scale ventilation grilles, as the sections in principle only need to have a limited "length" (height of the trapezoid) for anchoring. Thus, a piece of the sheet material can be cut out and used for other applications, such as smaller frames.

[0032] In a further alternative embodiment, the cuts are provided as an H-shaped cut, wherein the ends of the H-shaped cut are positioned on the long sides of the circumscribed rectangle, and wherein the cuts comprise 4 corner cuts, which extend from the corner points of the circumscribed rectangle towards the nearest end of the H-shaped cut. In this embodiment, the horizontal line of the H runs parallel to the long side of the rectangle, and the corner cuts run parallel along the long side. In this way, the sections are rectangular, wherein the section on the short side extends across the entire short side, and on the long side only over a portion thereof, preferably at least 50%, more preferably at least 60%, 66% or even 75% or 80%. By appropriately selecting the length of the corner cuts, it can be ensured that the sections on the long side have sufficient length to accommodate anchoring openings or for the fixation of support beams.

[0033] It should be noted that a variation on the above embodiment is possible wherein the ends of the H-shaped cut are positioned on the short sides of the circumscribed rectangle, in which case the sections on the short side will be quite short, and the sections on the long side will run along the entire side.

[0034] In a further preferred embodiment, the cuts extending from the short sides of the circumscribed rectangle are provided with one or more, preferably at least two, attachment openings, suitable for receiving an attachment element for coupling with an external object. These openings can be very simple holes with a diameter such that a typical screw can pass through with the shank, but not with the head, allowing the frame to be connected to an external object, such as a piece of wall or plenum.

[0035] In other embodiments, one or more, typically two opposing, sections can be provided with one or more, preferably two, attachment openings.

[0036] In a preferred embodiment, the method further comprises a step of providing at least two support cuts in each of the sections on two opposite sides of the opening, preferably on the long sides of the opening, wherein the support cuts preferably are perpendicular to the side from which the sections extend. Additionally, the method comprises a step of providing at least two elongated support beams, wherein each support beam is dimensioned to be received at a first end in a support cut of a first of the two sections, and to be received at a second end in a support cut of a second of the sections, wherein the length of the support beams is substantially equal to or greater than the distance between the sides from which said sections with support cuts extend.

[0037] Herein, the step of folding the sections is performed such that the ends of the support beams are received in the support cuts of the sections with support cuts, and said sections hold the support beams in place.

[0038] In the prior art, the support beams are anchored to the sections via a clip, which is clamped shut thereby securing the support beam and section together. On the one hand, this is an additional action (twice per support beam, so usually at least 4 extra actions), and also extra material that is required (clips). By using a cut in the sections where the support beam can be provided, the step is no longer necessary, nor is the extra material. Moreover, the possibility of the support beam and/or clip becoming detached is no longer present due to the direct anchoring of the support beam in/on the section.

[0039] By making the support beams slightly longer than the distance of the folded sections, it is possible to secure the support beams in the support cuts by first bending the sections too far, and then bending them back. In this configuration, it is impossible for the support beams to be removed from the support cuts without substantially deforming the support beams and/or the sections. Under normal circumstances, these are out of reach of people, so the risk of this is almost zero.

[0040] The support cuts are usually provided towards the ends of the long side, but for longer frames, one or more intermediate support beams can be provided at more central positions along the length of the long side.

[0041] In a preferred embodiment, the method com-

prises a step of folding at least one of the two opposing sections to an angle relative to the original position of the section beyond the angle of the final position relative to the original position, after which the support beam is placed, and subsequently folding said at least one of the two opposing sections back to the final position.

[0042] In this manner, the support beam is secured in and between the two folded-back sections, where previously the support beam had to be attached using additional elements (such as clips), which meant extra material and production steps, and there was a high likelihood that the support beam could come loose. Alternative techniques for attachment include, for example, welding, but this again requires additional steps.

[0043] Preferably, the support beams themselves are made of sheet material with a greater thickness than the sheet of the frame itself. The support beams are thus reinforced, as they do not have reinforcing ribs or other elements to increase their rigidity.

[0044] In a further preferred embodiment, the opening is rectangular, and the support cuts are provided on the sections along the long sides of the opening. Herein, a support cut is provided in each outer zone of said sections, wherein each of the outer zones extends from the short sides along the long sides for a length of at most 25%, preferably at most 20%, more preferably at most 15%, of the long side. Here, the outer zones are the most lateral parts of a section, located close to the short sides.

[0045] Preferably, the support cuts are located at a maximum distance of 7.5 cm from the nearest short side, more preferably at a maximum of 5.0 cm.

[0046] Preferably, the support cuts are located at a distance of at least 2.5 cm from the short side, and more preferably at least 3.5 cm.

[0047] In very long frames, one or more additional support cuts can be provided across the sections, for better support of the bars or slats that will be placed on them in a subsequent production step. Typically, these are positioned more centrally, and preferably at equal distances from each other and/or symmetrically.

[0048] In a further preferred embodiment, the method comprises a step of coupling bars or slats onto the support beams, perpendicular to the support beams, preferably by placing the bars or slats into receiving cuts in the support beams, said receiving cuts being dimensioned to at least partially clampingly receive the bars or slats. Hereby, the frame is further finished into a ventilation grille. The method of attaching the bars or slats may vary from what is described above (receiving cuts in the support beams).

[0049] In a preferred embodiment, the sheet is substantially rectangular, and the method comprises the steps of:

a. removing a piece of the sheet at the corners of the sheet; and

b. the folding of sections at the outer edges of the sheet towards the first side of the sheet.

[0050] In this manner, the edges of the sheet are finished, among other things, so that no sharp edges are visible or tangible once the ventilation grille is installed, given that the folded sections at the outer edges are at least partially located within the wall, out of reach of individuals.

[0051] The pieces of sheet that are removed are often very small and can also have been removed earlier in the process, rather than just prior to the step of folding the outer edges.

[0052] The folded outer edges have a minimum "height" (relative to the plane of the sheet) of 0.25 cm, preferably at least 0.3 cm or even 0.4 cm. The maximum is 2.0 cm, preferably at most 1.5 cm or even 1.0 cm or 0.75 cm.

[0053] These folded outer edges primarily aim to keep sharp edges away from the users, and to provide an aesthetically pleasing impression.

[0054] In a preferred embodiment, the sheet comprises steel, and preferably, the sheet is made of steel.

[0055] In a preferred embodiment, the sheet has a thickness of at least 0.5 mm, preferably at least 0.75 mm, more preferably at least 1 mm or approximately equal thereto. Preferably, the sheet has a thickness of at most 5 mm, preferably at most 4 mm, more preferably at most 3 mm, and most preferably at most 2.5 mm or even 1.5 mm. It should be noted that larger thicknesses can be chosen in case of large ventilation grilles, and smaller thicknesses in case of small ventilation grilles.

[0056] In a second aspect, the invention relates to a method for manufacturing ventilation grilles, comprising a step of manufacturing a frame by a method according to the first aspect; a step of providing and fixing two or more support beams to the frame on the first side, wherein the support beams extend between opposing sides of the opening of the frame; and a step of providing and fixing a plurality of slats or bars on the support beams, preferably parallel to each other and at equal intervals.

[0057] In a third aspect, the invention relates to a frame for a ventilation grille manufactured by a method according to the first aspect.

[0058] In a fourth aspect, the invention relates to a ventilation grille manufactured by a method according to the second aspect.

[0059] In a fifth aspect, the invention relates to the use of a frame according to the third aspect, for the manufacture of a ventilation grille, preferably according to the fourth aspect.

[0060] In what follows, the invention is described by way of non-limiting examples illustrating the invention, and which are not intended to and should not be interpreted as limiting the scope of the invention.

EXAMPLES

[0061] The figures depict a specific embodiment, where the frame (1) is rectangular, and has a rectangular opening (2), defined by a circumscribed rectangle around

the cuts (3a, 3b, 3c, 3d, 3e), wherein from each side of the circumscribed rectangle an isosceles trapezoidal section (4a, 4b, 4c, 4d) extends, which is folded over in a subsequent step. The edges of the opening (2) form the fold lines for the sections (4a-4d), over which they are folded to the back side of the sheet, as can be seen in Figure 2, where a side view is shown. The folded sections (4a-4d) are at an angle of approximately 90° relative to the frame itself.

[0062] Figure 1 shows the metal sheet provided with the cuts, prior to folding the sections (4a, 4b, 4c, 4d). The cuts comprise a central cut (3a), and 4 corner cuts (3b-3e), wherein the central cut is positioned centrally in the opening (2) and concerns a rectangular removed sheet. From the corners of the rectangular central cut, the corner cuts (3b-3e) extend to the corners of the opening (2), at an angle of approximately 45° relative to the edges of the opening.

[0063] Additionally, in Figures 1 and 2, the folded outer edges (5) are also visible, for which a piece of sheet (6) is removed at the corners of the sheet.

[0064] The sections (4a, 4c) on the long sides of the opening (2) are each provided with two support cuts (7), wherein the support cuts are perpendicular to the edge of the long side and are located at the lateral ends of the sections (4a, 4c), towards the short sides. The support cuts (7) on the individual sections (4a, 4c) are mirrored relative to each other, as well as relative to the support cuts on the other section.

[0065] The sections (4b, 4d) on the short sides of the opening (2) are provided with two attachment openings (11), through which a screw can be inserted to attach the ventilation grille to a plenum or a similar structure.

[0066] In this example, the frame has a length of approximately 335.5 mm and a width of approximately 135.5 mm before folding, wherein after folding the outer edges, the length is approximately 328.6 mm and the width is approximately 128.6 mm, wherein the outer edges after folding have a height of approximately 4 mm relative to the flat side of the frame. The sheet of the frame has a thickness of about 1 mm.

[0067] The opening in the frame has a length of approximately 280 mm and a width of approximately 80 mm.

[0068] The central cut has a length of approximately 210 mm and a width of approximately.

[0069] The sections protrude approximately 35 mm above the frame when they are folded into a perpendicular position.

[0070] The support cuts are positioned at a distance of approximately 12 mm from the small base of the section, and at approximately 35-40 mm from the corner points of the opening, and have a length of approximately 10 mm and a width of approximately 2 mm.

[0071] Figure 3 shows a view of the support beam (8), which extends longitudinally and is dimensioned to approximately correspond in length with the width of the opening (2). The support beam (8) is equipped with a lip (9) at both ends that has an equal width and length as the support cuts and extends over a distance of at least 1 mm from the support beam, in line with it, allowing it to be fitted into the support cuts, and held therein. By selecting identical dimensions, the lip can be forced into the opening and is thereby automatically retained therein.

[0072] The support beam (8) comprises on the upper side a plurality of receiving cuts (10), in the form of V-shaped cuts, in which slats with a U- or V-shaped profile can be placed.

[0073] Figure 4 shows a side view of the support beam (8).

[0074] The specific shape of the receiving cut (10) is shown enlarged in Figure 5. The proportions here are representative in terms of ratios but may nevertheless vary. The shown proportions, and in particular the angle at which the legs (10a, 10b) of the receiving cuts extend, allow for easy placement, and deviate only slightly from the perpendicular position to gradually spread the legs of the slats that are fed into the cuts, yet sufficiently so that removal of the slats after placement is only possible through a deliberate, forceful action, to avoid unwanted removal.

[0075] In this example, the support beam has a length of 82.5 mm, including the lips, which are each about 1.5 mm long, and have a height of about 10 mm, which is half the height of the support beam itself, namely 20 mm. The thickness of the support beam is approximately 2 mm. The receiving cuts are regularly placed along the length of the support beam and are spaced at a distance of approximately 12.5 mm (center to center).

[0076] The receiving cuts (10) have an initial opening of approximately 5.5 mm. After approximately 1.6 mm, the opening splits into two legs (10a, 10b), each extending about 5 mm deep into the support beam and separated by a wedge that is initially about 1.6 mm wide, and gradually widens.

[0077] Figure 6 finally shows a complete ventilation grille, with a frame (1) according to Figures 1-2, support beams (8) according to Figures 3-5, and 6 slats (12) provided in the support beams.

[0078] It should be understood that the above dimensions are provided purely as an example, and that variations are possible depending on the requirements in a specific application.

[0079] The present invention should not be construed as being limited to the embodiments described above and certain modifications or changes may be added to the examples described without having to re-evaluate the appended claims. For example, the current invention was described with reference to rectangular frames with rectangular openings, but it should be clear that the invention can be applied to, for example, more general frames with polygonal or even round openings, given that the invention is primarily focused on the fact that the frame is substantially manufactured as a single piece (with the exception of the support beams and any slats/bars, which, however, are part of the further processing of the frame into a ventilation grille).

Claims

1. Method for manufacturing frames for ventilation grilles, wherein the frame comprises a polygonal, preferably substantially rectangular, opening, comprising the following steps:

    a. providing a metal sheet;
    b. the application of internal cuts through the sheet, wherein the cuts define a circumscribed polygon that pertains to the opening of the frame, and wherein the cuts define multiple sections that extend from each of the sides of the circumscribed polygon inwardly into the circumscribed polygon;
    c. folding the sections towards a first side of the metal sheet over the side from which the sections extend, to an angle of at least 60°, preferably at least 75°, and most preferably about 90°, relative to the metal sheet;

    characterized in that the method further comprises the following steps:

    d. providing at least two support cuts in each of the sections on two opposite sides of the opening, preferably on the long sides of the opening, wherein the support cuts preferably are perpendicular to the side from which the sections extend;
    e. providing at least two elongated support beams, wherein each support beam is dimensioned to be received at a first end in a support cut of a first of the two sections, and to be received at a second end in a support cut of a second of the sections, wherein the length of the support beams is substantially equal to or greater than the distance between the sides from which said sections with support cuts extend;

    wherein the step of folding the sections is performed such that the ends of the support beams are received in the support cuts of the sections with support cuts, and said sections hold the support beams in place.

2. The method for manufacturing frames for ventilation grilles according to the preceding claim 1, wherein at least one, and preferably each, of the cuts are made by punching.

3. The method for manufacturing frames for ventilation grilles according to the preceding claim 1 or 2, wherein at least one, and preferably each, of the cuts is made by laser cutting.

4. The method for manufacturing frames for ventilation grilles according to any of the preceding claims 1 to 3, wherein the circumscribed polygon pertains to a circumscribed rectangle.

5. The method for manufacturing frames for ventilation grilles according to the preceding claim 4, wherein the cuts comprise four corner cuts, which extend internally from the corner points of the circumscribed rectangle within the circumscribed rectangle, preferably as a line segment at an angle of at least 20° relative to the sides of the circumscribed rectangle, towards a central cut parallel to a long side of the circumscribed rectangle, and preferably located in the middle between the two long sides of the circumscribed rectangle.

6. The method for manufacturing frames for ventilation grilles according to the preceding claim 4, wherein the cuts comprise four corner cuts, and wherein the cuts comprise four central cuts, which central cuts define a cut-out rectangle, preferably centered in the circumscribed rectangle, and wherein the corner cuts extend internally within the circumscribed rectangle from the corner points of the circumscribed rectangle, preferably as a line segment at an angle of at least 20° relative to the sides of the circumscribed rectangle, towards the nearest corner point of the cut-out rectangle.

7. The method for manufacturing frames for ventilation grilles according to the preceding claim 4, wherein the cuts are provided as an H-shaped cut, wherein the ends of the H-shaped cut are positioned on the long sides of the circumscribed rectangle, and wherein the cuts comprise 4 corner cuts, which extend from the corner points of the circumscribed rectangle towards the nearest end of the H-shaped cut.

8. The method for manufacturing frames for ventilation grilles according to any of the preceding claims 4 to 7, wherein the cuts extending from the short sides of the circumscribed rectangle are provided with one or more, preferably at least two, attachment openings, suitable for receiving an attachment element for coupling with an external object.

9. The method for manufacturing frames for ventilation grilles according to any of the preceding claims 1 to 8, wherein the opening is rectangular, and the support cuts are provided on the sections along the long sides of the opening, wherein a support cut is provided in each outer zone of said sections, wherein each of the outer zones extends from the short sides along the long sides for a length of at most 25%, preferably at most 20%, more preferably at most 15%, of the long side.

10. The method for manufacturing frames for ventilation grilles according to the preceding claims 1 to 9, comprising a step of coupling bars or slats onto the sup-

port beams, perpendicular to the support beams, preferably by placing the bars or slats into receiving cuts in the support beams, said receiving cuts being dimensioned to at least partially clampingly receive the bars or slats.

11. The method for manufacturing frames for ventilation grilles according to any of the preceding claims 1 to 10, wherein the sheet is substantially rectangular, and comprising steps of:

a. removing a piece of the sheet at the corners of the sheet;
b. the folding of sections at the outer edges of the sheet towards the first side of the sheet.

12. The method for manufacturing frames for ventilation grilles according to any of the preceding claims 1 to 11, wherein the sheet comprises and preferably is steel.

13. The method for manufacturing frames for ventilation grilles according to any of the preceding claims 1 to 12, wherein the sheet has a thickness of at least 1 mm, preferably at least 1.5 mm, and more preferably at least 2.0 mm; and wherein the sheet has a thickness of at most 5 mm, preferably at most 4 mm, more preferably at most 3 mm, and most preferably at most 2.5 mm.

14. The method for manufacturing ventilation grilles, comprising the following steps:

a. manufacturing a frame by a method according to any of the preceding claims 1 to 13;
b. providing and fixing two or more support beams to the frame on the first side, wherein the support beams extend between opposing sides of the opening of the frame;
c. providing and fixing a plurality of slats or bars on the support beams, preferably parallel to each other and at equal intervals.

15. Frame for a ventilation grille, manufactured by a method according to any of the preceding claims 1 to 14.

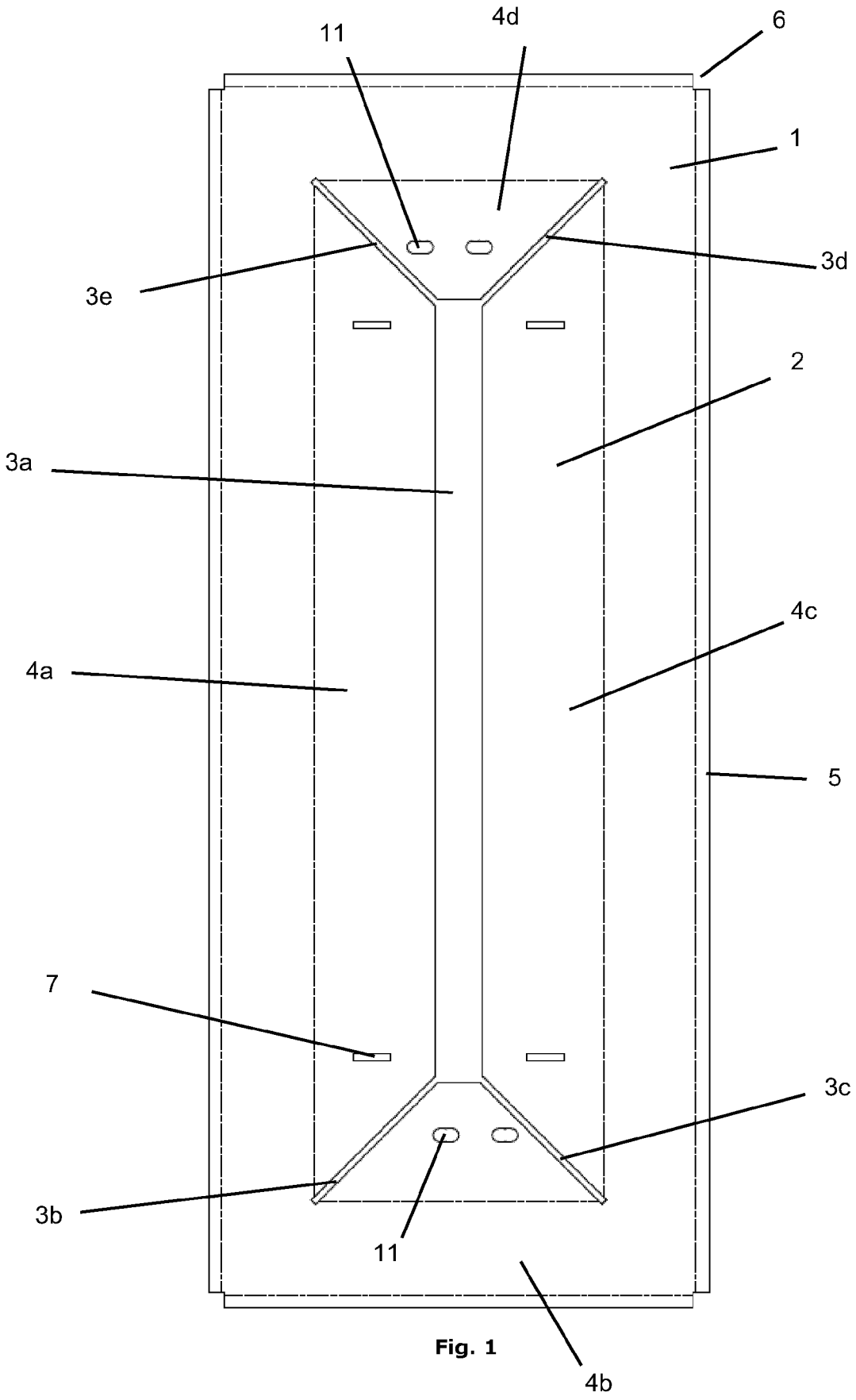

Fig. 1

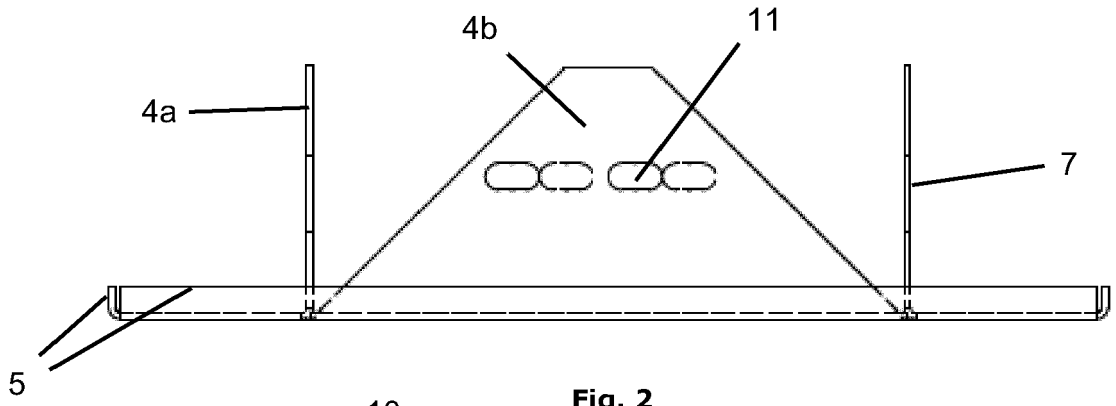

Fig. 2

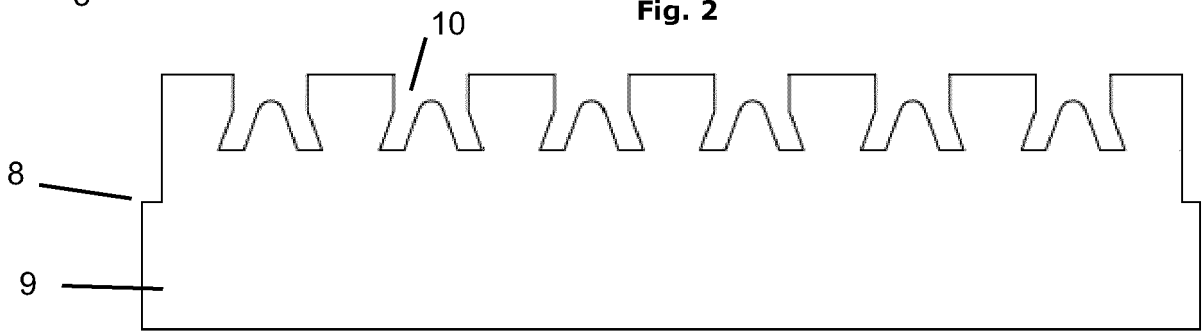

Fig. 3

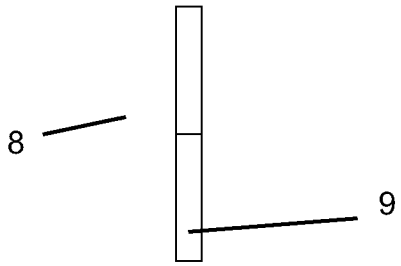

Fig. 4

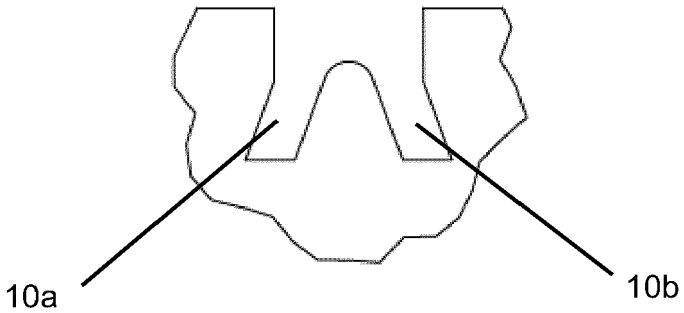

Fig. 5

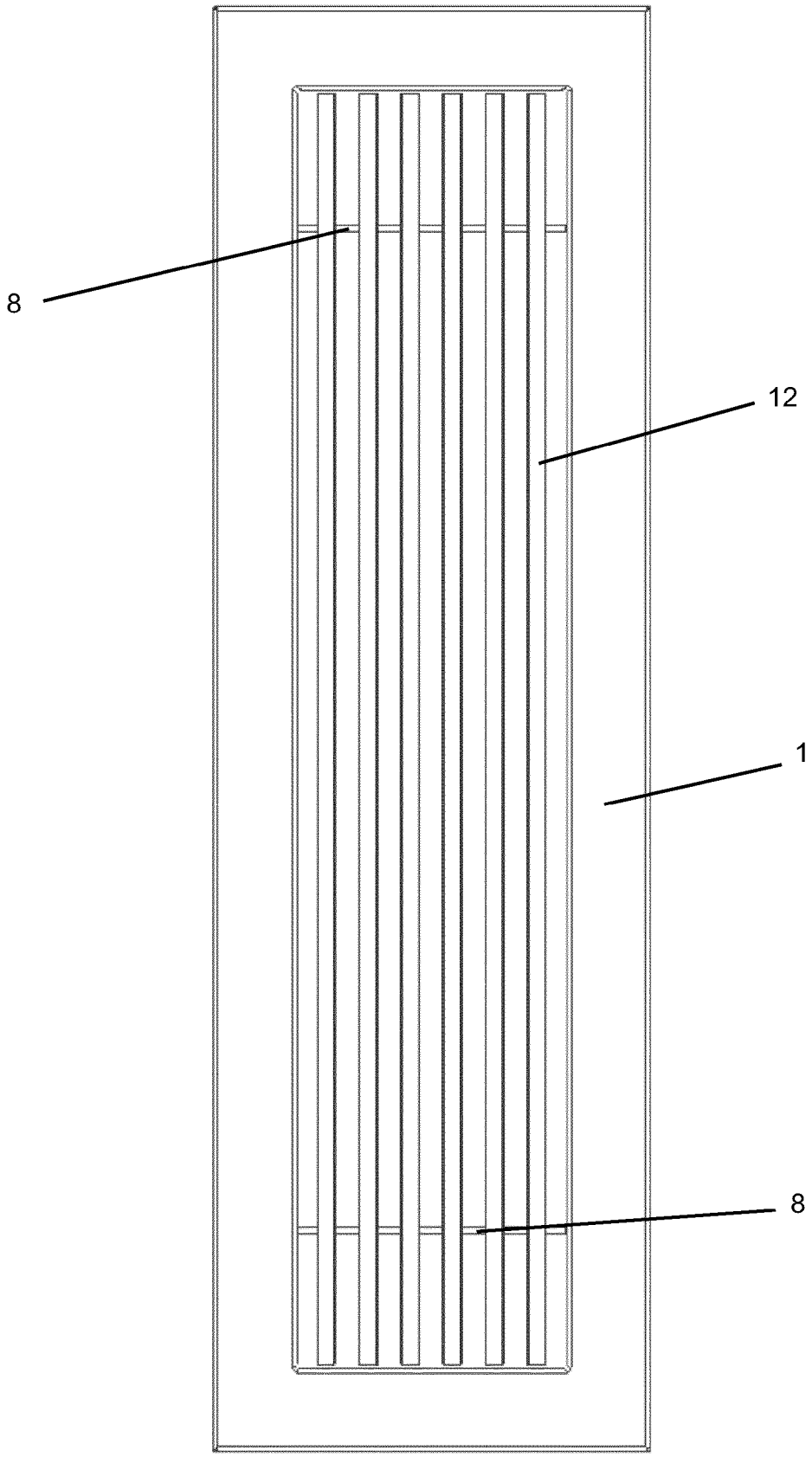

Fig. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 23 21 5177

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	11 April 2024	Knecht, Frank

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11-04-2024

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