



EUROPEAN PATENT APPLICATION

(43) Date of publication:
15.04.2020 Bulletin 2020/16

(51) Int Cl.:
E04F 13/08 (2006.01)

(21) Application number: **18200140.4**

(22) Date of filing: **12.10.2018**

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

(71) Applicant: **Prodatek A/S**
8940 Randers SV (DK)

(72) Inventor: **LAURSEN, Bjørn Lyneborg Rohde**
8382 Hinnerup (DK)

(74) Representative: **Patentgruppen A/S**
Aaboulevarden 31, 4
8000 Aarhus C (DK)

(54) **A MOUNTING RAIL FOR MOUNTING CLADDING, A METHOD FOR PROVIDING CLADDING TO A BUILDING SURFACE AND USE OF A MOUNTING RAIL**

(57) Disclosed is a mounting rail (1) for providing cladding (2) to a building surface (3), the mounting rail (1) comprising a fixation arm (4) for fixating said mounting rail (1) to said building surface (3), a supporting arm (5) arranged for supporting said cladding (2) when in use, wherein said supporting arm (5) further comprises suspension means (6) for suspending said cladding (2) on said mounting rail (1), a traverse arm (7) arranged to connect said fixation arm (4) and said supporting arm (5), wherein said traverse arm (7) is angled in relation to said fixation arm (4), so that when said fixation arm (4) is fixated to a vertical building surface (3) such that said mounting rail (1) is substantially horizontal, said mounting rail (1) can be mounted with said traverse arm (7) slanting downwards from said fixation arm (4) and out, wherein said supporting arm (5) is angled in relation to said traverse arm (7), so that when said fixation arm (4) is fixated substantially horizontally to a vertical building surface (3), said mounting rail (1) can be mounted with said supporting arm (5) extending upwards from the intersection between said traverse arm (7) and said supporting arm (5), and wherein said mounting rail (1) is provided with venting holes (8) at said intersection.

Furthermore, a method for providing cladding (2) to a building surface (3) is provided.

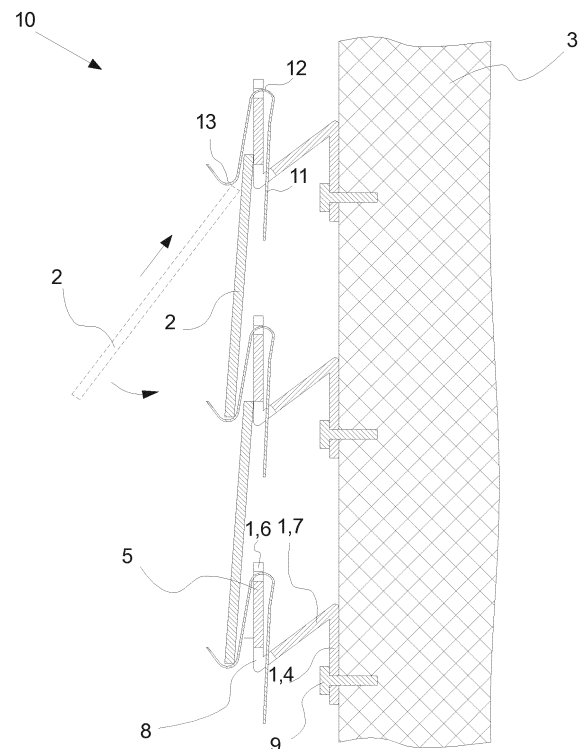


Fig. 5

Description

Field of the invention

[0001] The invention relates to a mounting rail for providing cladding to a building surface where the mounting rail comprises a fixation arm for fixating the mounting rail to the building surface and a supporting arm arranged for supporting the cladding when in use and wherein the supporting arm further comprises suspension means for suspending the cladding on the mounting rail. The invention also relates to a cladding mounting system method for providing cladding to a building surface and use of a mounting rail.

Background of the invention

[0002] Facade cladding may be applied on newly erected buildings or in connection with renovation of existing buildings e.g. if an existing building is post-insulated by providing it with a thermal envelope. Different methods exist for attaching the cladding to a building facade or roof, such as fixating the cladding directly to the building surface. However, attaching the cladding directly against the building surface can result in moisture build-up between the cladding and the building surface.

[0003] From the European patent application EP 3 020 883 A1 it is therefore known to attach the cladding by means of horizontal mounting rails connected to the building surface by means of vertical rails. However, this system is complicated and expensive.

[0004] It is therefore an object of the present invention to provide for an advantageous technique for providing cladding to a building surface.

The invention

[0005] The invention provides for a mounting rail for providing cladding to a building surface, the mounting rail comprising a fixation arm for fixating the mounting rail to the building surface and a supporting arm arranged for supporting the cladding when in use, wherein the supporting arm further comprises suspension means for suspending the cladding on the mounting rail. The mounting rail further comprises a traverse arm arranged to connect the fixation arm and the supporting arm, wherein the traverse arm is angled in relation to the fixation arm, so that when the fixation arm is fixated to a vertical building surface such that the mounting rail is substantially horizontal, the mounting rail can be mounted with the traverse arm slanting downwards from the fixation arm and out. The supporting arm is angled in relation to the traverse arm, so that when the fixation arm is fixated to a vertical building surface such that the mounting rail is substantially horizontal, the mounting rail can be mounted with the supporting arm extending upwards from the intersection between the traverse arm and the supporting arm, and wherein the mounting rail is provided with venting

holes at the intersection.

[0006] In EP 3 020 883 A1 the vertical rails are provided to enable easy mounting of the horizontal rails and to ensure vertical air passage between the areas between the horizontal rails, to ensure sufficient venting. Thus, when mounting the horizontal mounting rail directly on the building surface as according to the present invention it is advantageous to provide the mounting rail with venting holes at the intersection between the traverse arm and the supporting arm to enable air circulation and thereby prevent moisture build-up and it is advantageous to arrange the venting holes at the end of the downward sloping traverse arm in that the venting holes hereby also can be used to guide any condensed water or other liquid downwards and away from the building surface, hereby further preventing moisture/liquid build-up in the construction and thereby preventing damage to the building and the cladding system.

[0007] It should be emphasized that the term "cladding" in this context should be understood as material applied over another to provide a skin or layer on a building outer surface and used to provide a degree of thermal insulation, weather resistance, and/or to improve the appearance of the building.

[0008] In this context the term "building surface" may be understood as the outer/inner wall of a house, a factory, office complex, outer/inner side of a roof, a free-standing wall, fence, barrier or any surface of a construction which enables mounting of the mounting rail and subsequently providing the cladding.

[0009] In this context, the term "suspension means" should be understood as a suspender in the form of any kind of hole, indentation, hook, pin or any other means suitable for suspending another object.

[0010] It should be emphasized that the term "venting holes" may be understood as an opening, an orifice, a passage or other allowing air passage through the mounting rail.

[0011] In an aspect of the invention, the fixation arm, the supporting arm and the traverse arm are formed from a single plate.

[0012] This is advantageous in that the mounting rail can be formed through e.g. bending which enables an easy and simple manufacturing process.

[0013] In an aspect of the suspension means and/or the venting holes are formed as punchings in the plate.

[0014] This is advantageous in that the manufacturing process is simplified in that the same punching form may be used to form the venting holes as well as the suspension means. The suspension means and venting holes may also be formed from individually shaped punching forms which are customized for the venting holes or the suspension means.

[0015] In an aspect of the invention the venting holes cover between 1 and 95%, preferably between 3 and 80% and most preferred between 5 and 60% of the total surface area of the traverse arm.

[0016] If the venting holes cover too much of the total

surface area of the traverse arm, the risk of the structural integrity of the arm being reduced to an unwanted level is increased. However, if the venting holes cover too little of the total surface area of the traverse arm, the risk of insufficient venting and/or draining is increased. Thus, the present area ranges present an advantageous relationship between structural integrity and function.

[0017] In an aspect of the invention the perpendicular distance from the fixation arm to the intersection is between 5 and 300mm, preferably between 8 and 150mm and most preferred between 12 and 60mm.

[0018] If the perpendicular distance from the fixation arm to the intersection is too big, it becomes too difficult and expensive to form the arm sufficiently rigid and strong. However, if the perpendicular distance is too little, the cladding will be too close to the building surface and it will become difficult to ensure sufficient ventilation and drainage between the building surface and the cladding. Thus, the present distance ranges present an advantageous relationship between structural integrity and function.

[0019] In an aspect of the invention the fixation arm and the supporting arm are substantially parallel.

[0020] Forming the fixation arm and the supporting arm substantially parallel is advantageous in that the supporting arm hereby can support the cladding over a larger area - making the final structure more stable - and in that the process of placing the cladding on the mounting rail is eased when the fixation arm and the supporting arm substantially parallel and in turn substantially parallel with the cladding layer.

[0021] In an aspect of the invention the suspension means are arranged as one or more indentations in an upper edge of the supporting arm, wherein the upper edge is the edge opposite of the intersection.

[0022] Forming the suspension means as one or more notches in the upper free edge of the supporting arm is advantageous in that it simplifies the mounting process if the cladding is to be suspended on the supporting arms and the indentations prevents mutual displacement between the cladding and the suspension arm.

[0023] Any orientation reference like up, down, upper, upwards, side etc. should throughout this application be seen in relation to a mounting rail being fixated to a vertical building surface with the longitudinal direction of the rail arranged substantially horizontal.

[0024] In an aspect of the invention the mounting rail is made from bended sheet metal.

[0025] This is advantageous in that the mounting rail may be formed from a simple bending process such that the manufacturing costs are minimized. And by forming the rail from sheet metal is advantageous in that this enables that a strong rail can be manufactured fast and inexpensively.

[0026] In an aspect of the invention the supporting arm is arranged in a supporting arm angle of between 1 and 89 degrees, preferably between 10 and 80 degrees and most preferred between 20 and 70 degrees in relation to

the traverse arm.

[0027] If the inside angle between the supporting arm and the traverse arm is too big, the inclination of the traverse arm becomes too little and the risk of moisture build-up on the rail is increased. However, if the inside angle between the supporting arm and the traverse arm is too little, the traverse arm will have to be very long to ensure that the distance between the fixation arm and supporting arm is sufficiently big, which will either make the rail less rigid or more expensive. Thus, the present angle ranges present an advantageous relationship between structural integrity and function.

[0028] In an aspect of the invention the traverse arm is arranged in a traverse arm angle of between 91 and 179 degrees, preferably between 100 and 170 degrees and most preferred between 110 and 160 degrees in relation to the fixation arm.

[0029] If the angle between the fixation arm and the traverse arm is too little, the inclination of the traverse arm becomes too little and the risk of moisture build-up on the rail is increased. However, if the inside angle between the fixation arm and the traverse arm is too big, the traverse arm will have to be very long to ensure that the distance between the fixation arm and supporting arm is sufficiently big, which will either make the rail less rigid or more expensive. Thus, the present angle ranges present an advantageous relationship between structural integrity and function.

[0030] In this context the angle between the fixation arm and the traverse arm is the upper angle between the fixation face - i.e. the surface abutting the building surface when the rail is mounted and in use - and the upper surface of the traverse arm.

[0031] The invention further relates to a cladding mounting system comprising mounting rails according to any of the previously discussed mounting rails arranged to be connected to a building surface by fixating the fixation arm to the building surface by means of connection means extending through the fixation arm and into the building surface. The system also comprises double hooks connected to the supporting arm, wherein each of the double hooks comprise a first hook arranged to engage the suspension means, and cladding placed with an edge in a second hook of the double hooks so that the cladding is carried by the double hooks.

[0032] Using double hooks for carrying the cladding is advantageous in that the cladding is not fixated directly to the building surface which may damage the building surface and/or the cladding. Furthermore, this provides for easy replacement of a cladding, whereby maintenance is eased.

[0033] In this context, the term "connection means" may be understood as a screw, nail, rivet, staple, bolt, pin or any other connecting means for connecting the fixation arm to the building surface.

[0034] In this context, the term "double hook" may be understood as an object which comprises at least two curves or bents for holding, carrying, catching or pulling

another object. Hence, the term "first hook" applies to one of the curves or bents and the term "second hook" applies to another curve or bent of the device.

[0035] The invention also relates to a method for providing cladding to a building surface, wherein the method comprises the steps of:

- fixing mounting rails according to any of the previously discussed mounting rails substantially horizontally to the building surface so that the supporting arm is extending upwards,
- connecting a double hook to the supporting arm by placing a first hook of the double hook in the suspension means, and
- fastening the cladding to the building surface by placing the cladding in a second hook of the double hook.

[0036] This is advantageous in that the process of providing cladding to a building surface is eased by first mounting the mounting rails on the building surface in a sufficient number of rows with adequate distance between them and where after the cladding is placed on the double hooks on the mounting rails. This is further advantageous in that the cladding is provided to the building surface with a sufficient distance to the building surface whereby buildup of moisture and thereby damage to the building surface is avoided.

[0037] In an aspect of the invention, the mounting rails are mounted in parallel rows with a mutual distance of less than the height of the cladding as measured perpendicular to the mounting rails.

Forming the mutual distance between the cladding rows less than the height of the cladding is advantageous in that the cladding hereby overlaps which can be used for preventing ingress of water and to ensure a better fixated cladding.

[0038] In an aspect of the invention, an upper part of the cladding is placed behind a bottom part of cladding suspended in a row above before the cladding is placed in a second hook of the double hook.

[0039] Placing the cladding under the cladding suspended in an upper row is advantageous in that both the upper edge and the bottom edge of the cladding is then fixated.

[0040] In an aspect of the invention, the fixation arm is fixated to the building surface by means of connection means extending through the fixation arm and into the building surface.

[0041] This is advantageous in that a strong connection between the fixation arm and the building surface is achieved.

[0042] In an aspect of the invention, use of a mounting rail according to the above-mentioned mounting rails is provided for providing cladding to an outside building surface by means of the above-described method.

[0043] Using mounting rails according to the present invention for providing cladding to an outside building surface is advantageous in that the present invention is

particularly suited for use outside in that it can be mounted fast and in that it will efficiently protect against harmful moisture build-up.

5 Figures

[0044] The invention will be described in the following with reference to the figures in which

- 10 fig. 1 illustrates a mounting rail, as seen in perspective,
- fig. 2 illustrates a mounting rail as seen from the side,
- 15 fig. 3 illustrates a mounting rail as seen from the front,
- fig. 4 illustrates a cladding mounting system as seen in perspective, and
- 20 fig. 5 illustrates a cladding mounting system as seen from the side.

Detailed description

25 **[0045]** Figures 1-3 illustrates a mounting rail 1, as seen in perspective, from the side and from the front, respectively.

[0046] In this embodiment, the mounting rail 1 is formed from a single piece of sheet metal which is bent to form the mounting rail 1. However, in another embodiment the fixation arm 4, the traverse arm 7 and the supporting arm 5 could be welded, soldered, bolted, screwed together or other processes for assembling the fixation arm 4, the traverse arm 7 and the supporting arm 5 to form the mounting rail 1.

35 **[0047]** In this embodiment, the venting holes 8 are provided at the intersection between the traverse arm 7 and the supporting arm 5. However, in another embodiment, the venting holes 8 could instead be provided only on the traverse arm 7 or only on the supporting arm 5 or entirely on both.

40 **[0048]** In this embodiment, the mounting rail 1 is made of aluminum, but in another embodiment, the mounting rail 1 could be made of steel, stainless steel, polymer, wood, composite material or other material which provides for necessary strength and material properties in relation to the specific requirements. The mounting rail 1 may be manufactured in different ways, including kind of molding process, milling, casting or other manufacturing processes.

50 **[0049]** In this embodiment, the supporting arm angle α and the traverse arm angle β are selected such that the supporting arm 5, the fixation arm 4 and/or the building surface 3 are substantially parallel, but in another embodiment the supporting arm angle α and the traverse arm angle β may be selected such that the supporting arm 5 is not parallel with the fixation arm 4 and/or the building surface 3.

[0050] In this embodiment the suspension means 6 is formed as a rectangular notch including a circular portion as illustrated in e.g. figure 3 such that a double hook may be placed in the circular part of the suspension means 6 whereby movement of the double hook 11 in the longitudinal direction of the mounting rail 1 is prevented. However, in another embodiment, a wide clip could be placed in the suspension means 6 which fits in the rectangular portion of the suspension means 6. The suspension means 6 could also be formed by a punching of rectangular, circular or triangular shape or any other shape suitable for supporting e.g. a double hook or a wide clip.

[0051] In an embodiment where slender double hooks 11 are used for supporting the claddings 2 one would find, depending on the width of the cladding 2, that it may be necessary to support the lower edge of the cladding 2 on two or more double hooks 11 on the mounting rail such that the cladding is sufficiently stable and does not tilt. However, in an embodiment, where wide clips may be used, and depending on the width of the cladding 2, the lower edge of the cladding 2 may be supported on just one clip.

[0052] In yet another embodiment, the suspension means 6 could be formed as a small stud or pin which is slightly pivoted outwards from the supporting arm 5 such that claddings 2 provided with holes may be attached to the mounting rail 1 by hanging the cladding 2 provided with a hole directly on the stud or pin.

[0053] Figures 4-6 illustrate a cladding mounting system 10 as seen in perspective, from the side and from the front, respectively.

[0054] When a building surface 3 is to be provided with claddings 2, the mounting rail 1 is at first fixed to the vertical building surface 3 via the fixation arm 4 such that the mounting rail 1 is substantially horizontal.

[0055] It should be emphasized that in addition to vertical building surfaces the mounting rail may also be mounted on tilted surfaces such as the tilted roof of a building or a tilted wall. This is advantageous in that the same mounting rail can be used on surfaces with varying tilting angle whereby the user does not need to carry different types of mounting rails for different building surfaces. This is further advantageous in that the use of a wrong mounting rail is avoided.

[0056] In this embodiment, the fixation arm 4 of the mounting rail 1 is fixated to the building surface 3 by means of screws drilled directly through the fixation arm 4, but in another embodiment, the connection means 9 could be a nail, rivet, staple, bolt, pin or any other means for connecting the fixation arm 4 to the building surface 3 and/or the fixation arm 7 could be provided with through holes (through which the connection means may extend), hooks or holes designed to engage matching hooks or holes on the building surface or other mechanical means or the fixation arm could be connected to the building surface by means of adhesive, welding or the like.

[0057] In this embodiment, the mounting rail 1 is fixated to a vertical building surface 3. However, in another em-

bodiment, the mounting rail 1 may be fixed to a tilted surface.

[0058] Depending on the surface area of the building surface 3, several rows of mounting rails 1 may be mounted on the building surface 3 such that the subsequent claddings 2 cover the building surface 3 as necessary. The distance between the rows of mounting rails 1 should not be larger than the height of the cladding 2 such that the upper edge of the cladding 2 is supported by the first hook 12 of the double hook 11 provided on a row of mounting rails 1 and the lower edge of the cladding 2 is supported by the second hook 13 on the double hook 11 provided on the below row of mounting rails 1.

[0059] With reference to figure 4, the cladding 2 is provided to the building surface by pushing the upper edge of the cladding 2 in the first hook 12 of the double hook 11 and positioning the lower edge of the cladding 2 on the second hook 13 of the double hook 11 on the row of mounting rails 1 one row below.

[0060] This may be repeated along the mounting rail 1 and for each row of mounting rails 1 until the building surface 3 is covered as required.

[0061] In this embodiment, the air ventilation between the cladding 2 and the building surface 3 is driven by natural forces (e.g. winds or thermal buoyancy) but in another embodiment, the air ventilation may be mechanically driven by e.g. a fan, compressor, a blower or other. In yet another embodiment, the air ventilation may be driven by mixed-mode ventilation.

[0062] It should be emphasized, that the cladding could be of rectangular shape, triangular shape, quadratic shape or any other suitable shape depending on the specific application.

[0063] Furthermore, the cladding may be made from a thermally insulating material, waterproof material, fire-proof material, wood, metal, brick, fibers, composite material or any material suitable in relation to the visual and/or functional modification of the building surface such as providing a rainscreen, fire-impeding layer, light-improvement, noise control or other modifications. The cladding could also be used for decorating the building surface by e.g. attaching cladding of different colors, sizes or shapes to form a symbol, pattern or letters or the cladding could be solar cells.

[0064] When the mounting rail is mounted to the building surface and the cladding is placed on the mounting rail, the cladding may either serve as the final layer of the building surface or a subsequent plastering may be performed depending on the cladding used and which type of building surface is provided with the cladding.

[0065] Although the mounting rail and cladding do not necessarily increase the structural strength of the building surface itself, i.e. it do not contribute to its stability in relation to its load bearing capabilities, it is nevertheless important that the mounting rail has sufficient strength and stiffness for transferring wind loads, impact loads, snow loads and its weight to the main structure of the building on which it is mounted.

[0066] The invention has been exemplified above with reference to specific examples of mounting rail 1, cladding 2, connection means 9 and other. However, it should be understood that the invention is not limited to the particular examples described above but may be designed and altered in a multitude of varieties within the scope of the invention as specified in the claims.

List of reference signs:

[0067]

1. Mounting rail
2. Cladding
3. Building surface
4. Fixation arm
5. Supporting arm
6. Suspension means
7. Traverse arm
8. Venting hole
9. Connection means
10. Cladding mounting system
11. Double hook
12. First hook
13. Second hook
- α . Supporting arm angle
- β . Traverse arm angle

Claims

1. A mounting rail (1) for providing cladding (2) to a building surface (3), said mounting rail (1) comprising a fixation arm (4) for fixating said mounting rail (1) to said building surface (3), a supporting arm (5) arranged for supporting said cladding (2) when in use, wherein said supporting arm (5) further comprises suspension means (6) for suspending said cladding (2) on said mounting rail (1), a traverse arm (7) arranged to connect said fixation arm (4) and said supporting arm (5), wherein said traverse arm (7) is angled in relation to said fixation arm (4), so that when said fixation arm (4) is fixated to a vertical building surface (3) such that said mounting rail (1) is substantially horizontal, said mounting rail (1) can be mounted with said traverse arm (7) slanting downwards from said fixation arm (4) and out, wherein said supporting arm (5) is angled in relation to said traverse arm (7), so that when said fixation arm (4) is fixated to a vertical building surface (3) such that said mounting rail (1) is substantially horizontal, said mounting rail (1) can be mounted with said supporting arm (5) extending upwards from the intersection between said traverse arm (7) and said supporting arm (5), and wherein said mounting rail (1) is provided with vent-

ing holes (8) at said intersection.

2. A mounting rail (1) according to claim 1, wherein said fixation arm (4), said supporting arm (5) and said traverse arm (7) are formed from a single plate.
3. A mounting rail (1) according to claim 2, wherein said suspension means (6) and/or said venting holes (8) are formed as punchings in said plate.
4. A mounting rail (1) according to any of the preceding claims, wherein said venting holes (8) covers between 1 and 95%, preferably between 3 and 80% and most preferred between 5 and 60% of the total surface area of said traverse arm (7).
5. A mounting rail (1) according to any of the preceding claims, wherein the perpendicular distance from said fixation arm (4) to said intersection is between 5 and 300mm, preferably between 8 and 150mm and most preferred between 12 and 60mm.
6. A mounting rail (1) according to any of the preceding claims, wherein said fixation arm (4) and said supporting arm (5) are substantially parallel.
7. A mounting rail (1) according to any of the preceding claims, wherein said suspension means (6) are arranged as indentation in an upper edge of said supporting arm (5), wherein said upper edge is the edge opposite of said intersection.
8. A mounting rail (1) according to any of the preceding claims, wherein said mounting rail (1) is made from bended sheet metal.
9. A mounting rail (1) according to any of the preceding claims, wherein said supporting arm (5) is arranged in a supporting arm angle (α) of between 1 and 89 degrees, preferably between 10 and 80 degrees and most preferred between 20 and 70 degrees in relation to said traverse arm (7).
10. A mounting rail (1) according to any of the preceding claims, wherein said traverse arm (7) is arranged in a traverse arm angle (β) of between 91 and 179 degrees, preferably between 100 and 170 degrees and most preferred between 110 and 160 degrees in relation to said fixation arm (4).
11. A cladding mounting system (10) comprising:
 - mounting rails (1) according to any of claims 1-10 arranged to be connected to a building surface (3) by fixating said fixation arm (4) to said building surface (3) by means of connection means (9) extending through said fixation arm (4) and into said building surface (3),

double hooks (11) connected to said supporting arm (5), wherein each of said double hooks (11) comprise a first hook (12) arranged to engage said suspension means (6), and cladding (2) placed with an edge in a second hook (13) of said double hooks (11) so that said cladding (2) is carried by said double hooks (11).

12. A method for providing cladding (2) to a building surface (3), said method comprising the steps of:

- fixing mounting rails (1) according to any of claims 1-10 substantially horizontally to said building surface (3) so that said supporting arm (5) is extending upwards,
- connecting a double hook (11) to said supporting arm (5) by placing a first hook (12) of said double hook (11) in said suspension means (6), and
- fastening said cladding (2) to said building surface (3) by placing said cladding (2) in a second hook (13) of said double hook (11).

13. A method according to claim 12, wherein said mounting rails (1) are mounted in parallel rows with a mutual distance of less than the height of said cladding (2) as measured perpendicular to said mounting rails (1).

14. A method according to claim 12 or 13, wherein said fixation arm (4) is fixated to said building surface (3) by means of connection means (9) extending through said fixation arm (4) and into said building surface (3).

15. Use of a mounting rail (1) according to any of claims 1-10 for providing cladding (2) to an outside building surface (3) by means of a method according to any of claims 12-14.

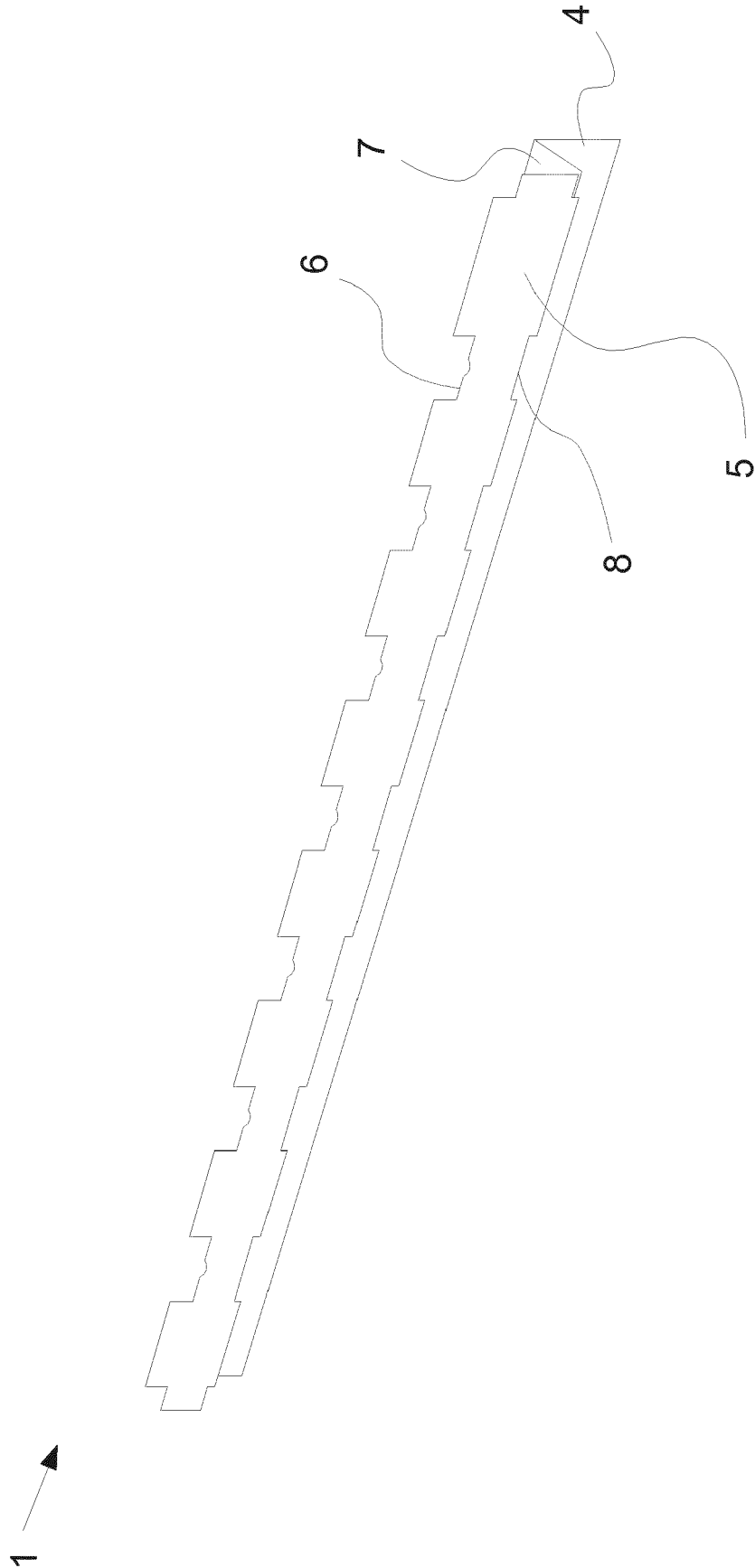


Fig. 1

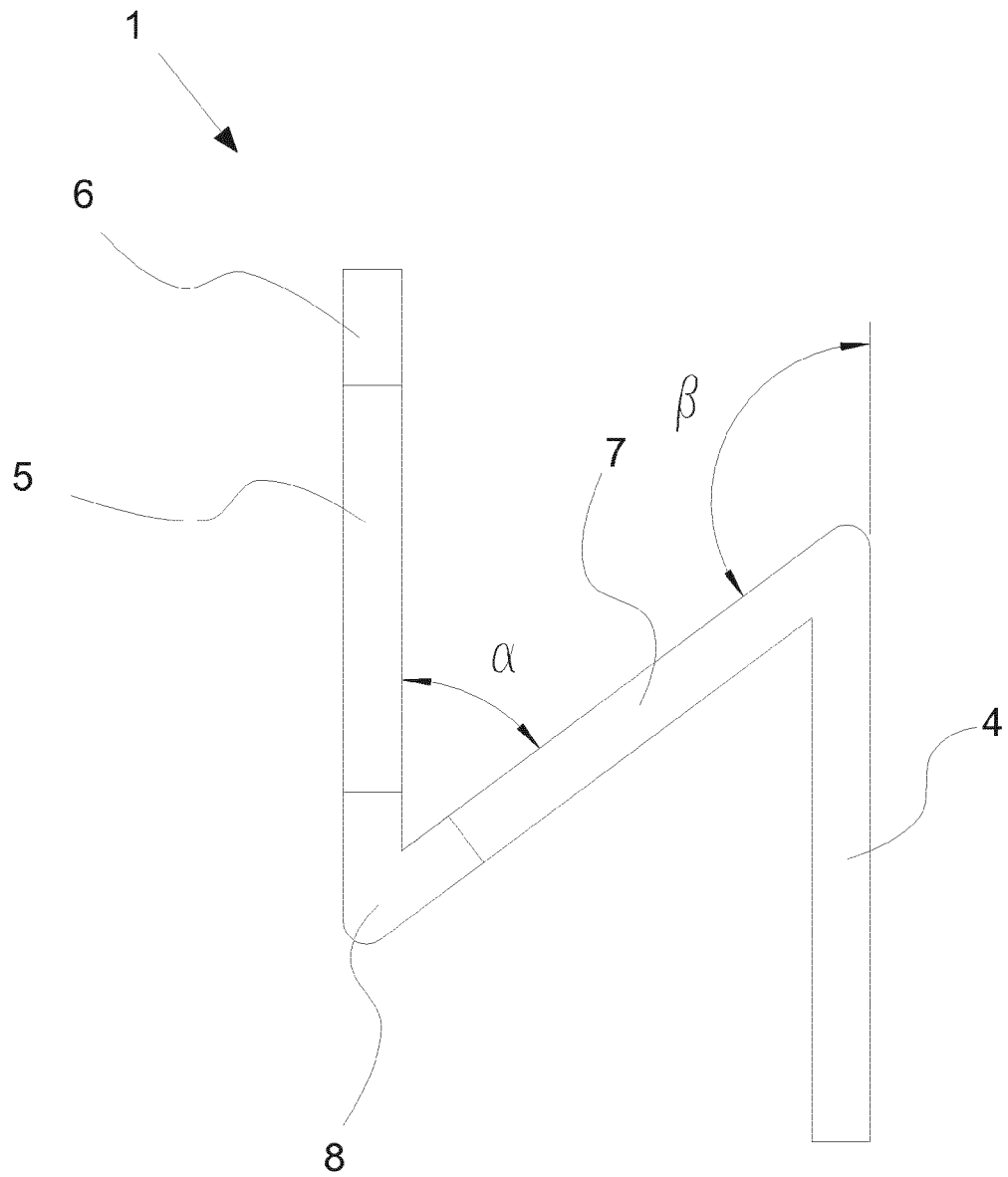


Fig. 2

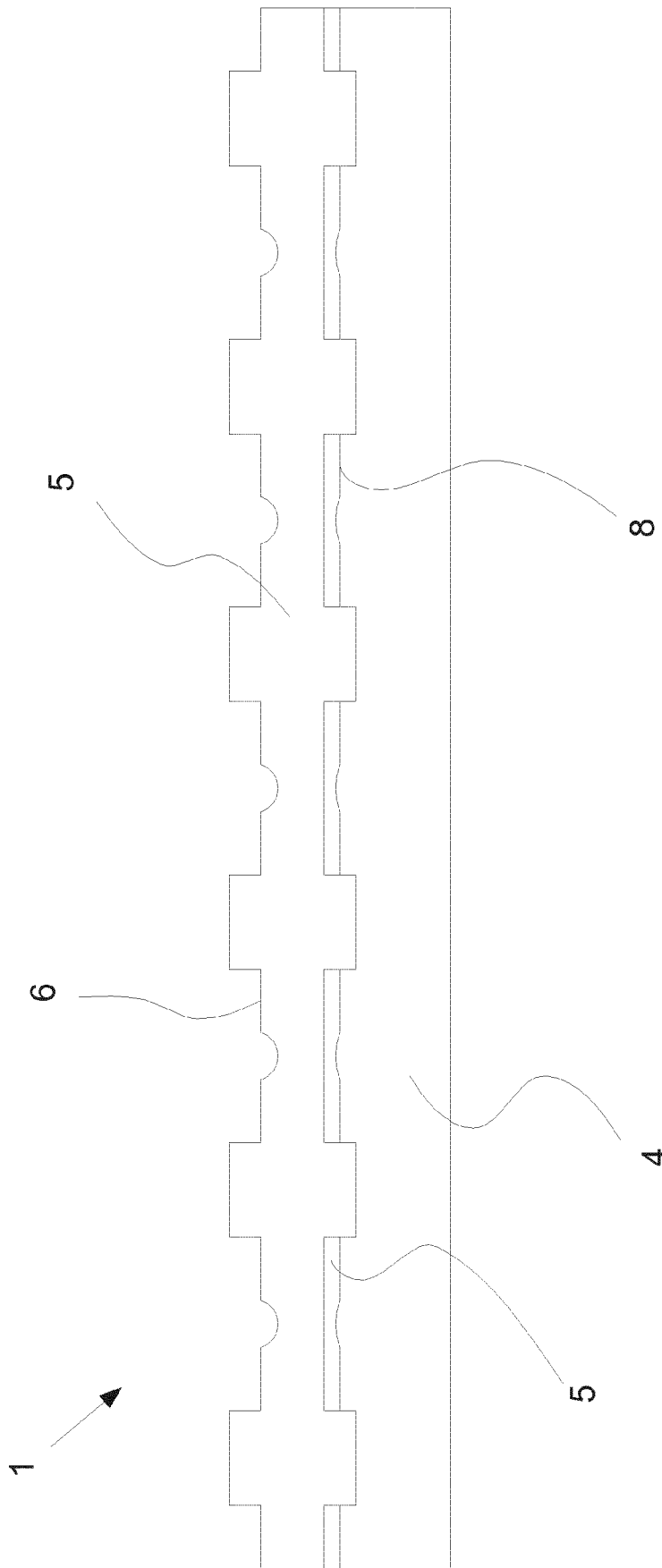
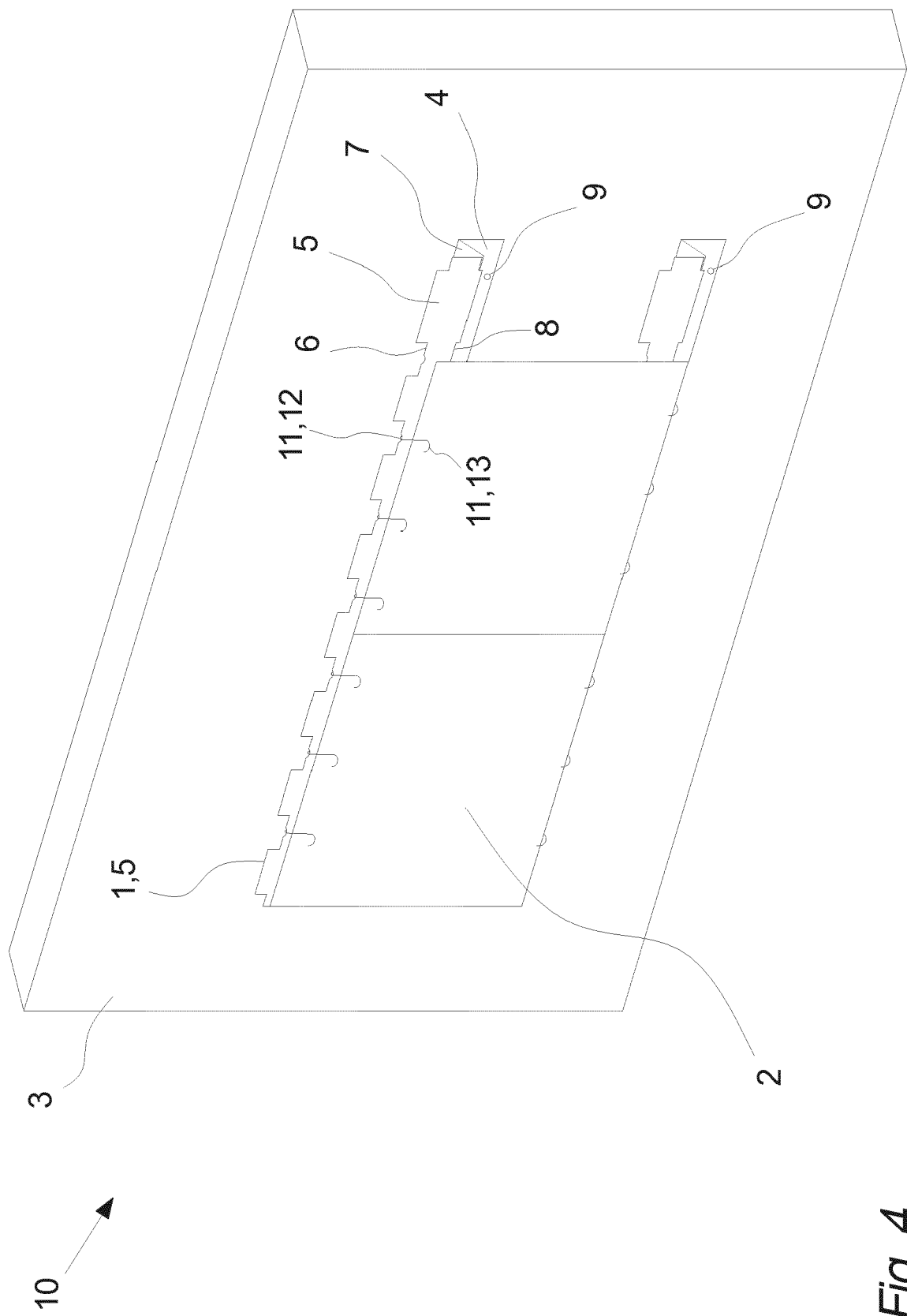


Fig. 3



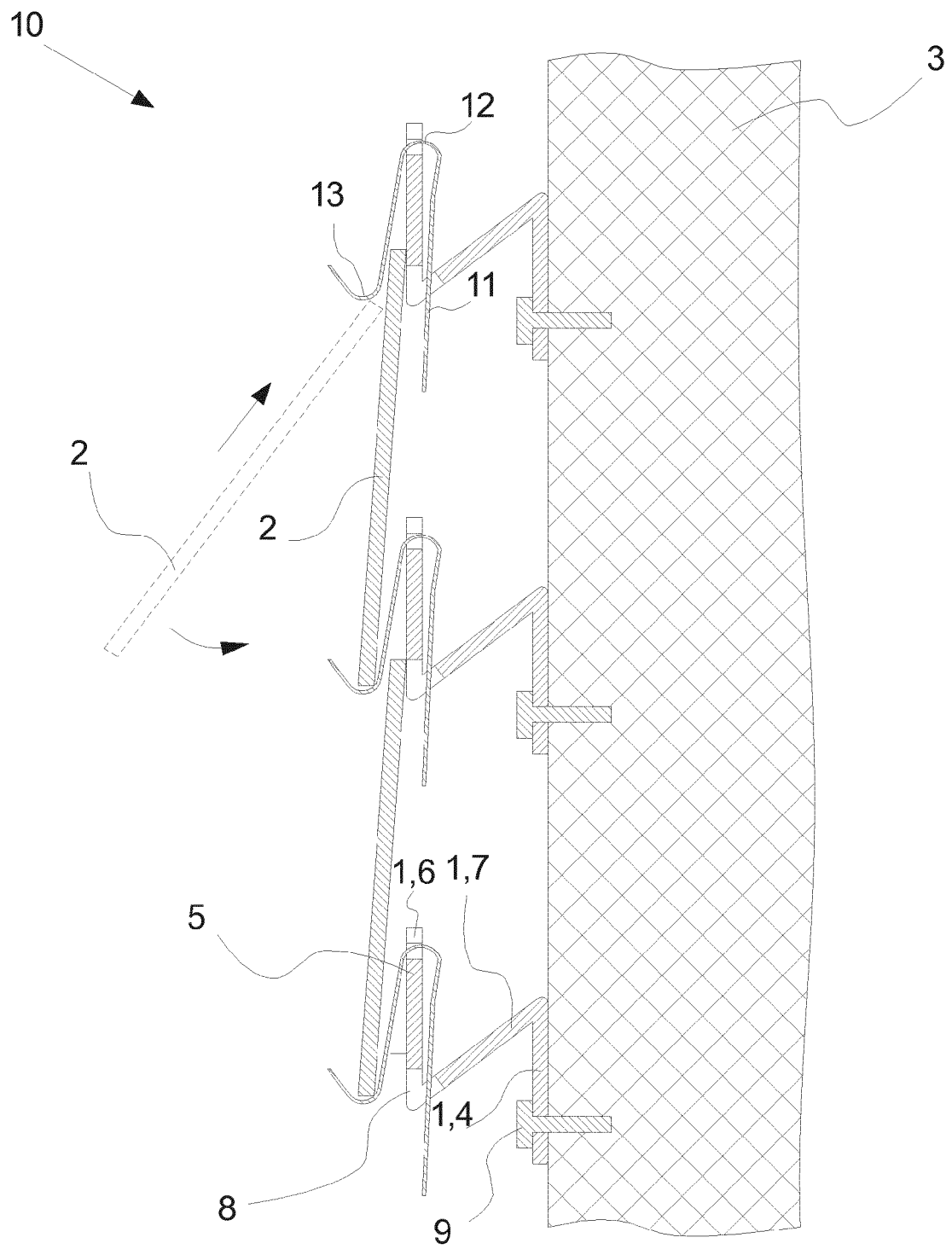


Fig. 5



EUROPEAN SEARCH REPORT

Application Number
EP 18 20 0140

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	FR 2 479 878 A1 (MATHIEU PIERRE [FR]) 9 October 1981 (1981-10-09) * page 5, line 13 - line 27; figure 2 *	1-15	INV. E04F13/08
Y	US 2002/032999 A1 (ITO HIROSHI [JP]) 21 March 2002 (2002-03-21) * paragraphs [0019] - [0028]; figures 1,3,4 *	1-6,8-10	
Y	DE 32 03 467 A1 (PROFIL VERTRIEB GMBH [DE]) 11 August 1983 (1983-08-11) * page 17, line 12 - page 18, line 19; figures 1-5 *	1,11-15	
Y	WO 2016/184473 A1 (KOMPROMENT HOLDING AF 2007 APS [DK]) 24 November 2016 (2016-11-24) * page 13, line 30 - page 14, line 22; figures 1,2 *	7	
			TECHNICAL FIELDS SEARCHED (IPC)
			E04F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 18 March 2019	Examiner Khera, Daljit
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 18 20 0140

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

18-03-2019

10

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR 2479878 A1	09-10-1981	NONE	

US 2002032999 A1	21-03-2002	CA 2357503 A1	20-03-2002
		JP 3490674 B2	26-01-2004
		JP 2002089008 A	27-03-2002
		US 2002032999 A1	21-03-2002

DE 3203467 A1	11-08-1983	NONE	

WO 2016184473 A1	24-11-2016	EA 201792448 A1	31-05-2018
		EP 3298211 A1	28-03-2018
		US 2018171640 A1	21-06-2018
		WO 2016184473 A1	24-11-2016

25

30

35

40

45

50

55

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- EP 3020883 A1 [0003] [0006]