(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 985 193 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
04.06.2025 Bulletin 2025/23

(21) Application number: **20202162.2**

(22) Date of filing: **15.10.2020**

(51) International Patent Classification (IPC):
E04D 13/068 *(2006.01)* ***E04D 13/072*** *(2006.01)*
E04D 13/064 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
E04D 13/0727; E04D 13/064; E04D 13/0641; E04D 13/0643; E04D 13/068; E04D 13/0685; E04D 13/0725

(54) **GUTTER ASSEMBLY**

DACHRINNENBAU

ASSEMBLAGE DE GOUTTIÈRES

(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

(43) Date of publication of application:
20.04.2022 Bulletin 2022/16

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(56) References cited:
EP-A2- 0 971 083
WO-A1-2020/028941
WO-A2-2004/011738
CN-A- 111 648 536
CN-U- 209 760 620
DE-U1- 9 207 858
GB-A- 2 066 872
JP-A- 2002 227 358
JP-A- 2012 062 643
JP-U- H0 532 549
JP-U- S 638 317
US-A- 4 727 689

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Description

Field of the invention

[0001] The invention relates to an extruded or through additive manufacturing produced gutter.

Background of the invention

[0002] Gutters have been known almost as long as people make buildings and houses. Known gutters mostly connect to roofs. These gutters were made from wood, ceramic, and even from tin (pewter) or copper. In the last 50 years, gutters made from polymer material have been introduced. Most of these gutters were single walled, requiring much coupling support. Examples of these gutters are in EP869230.

[0003] NL194090C (published as NL9202157A) introduced one of the first self-supporting gutters from synthetic material or polymer, in that case from PVC (polyvinylchloride). In the abstract, it was introduced as "Polyester gutter element for a bracketless corner gutter of a sloping roof, comprising an elongate strip for positioning and attaching the gutter element to a top surface of the lower area of the eaves, and a front upstand, which is essentially perpendicular to the positioning strip, and a rear upstand, which projects at an angle downwards from the positioning strip, as well as a bottom wall, which together with the front upstand defines a substantially V-shaped flow profile, the rear upstand being provided with a supporting or bearing surface which perpendicularly adjoins the positioning strip, in order to provide support against the end side of the bottom edge of the roof. The gutter element is hollow-walled and is provided with double walls which are connected to one another by longitudinal partitions, which at least locally form a framework structure."

[0004] EP0971083 A2 in its abstract states: "Device for roof gutter parts (2a,2b) to be connected to each other, which roof gutter parts have a front wall (6a,6b), a bottom wall (3a,3b) and a rear wall (4a,4b), which merge into each other via discontinuities - such as buckles-, comprising two coupling members (8,9), which each substantially follow the shape of the roof gutter parts in cross-section, as well as means for biassing the coupling members to each other to hold the adjacent ends of the roof gutter parts in between them, the upper coupling member being provided with at least one receiving space, such as a channel, for attaching a sealing profile therein which profile is destined to lie on the ends of the roof gutter parts, the sealing profile being formed by injection moulding, the biassing means being adapted to exert a pressure force on the sealing profile to press it against the inner surface of the gutter wall."

[0005] WO2004/011738 in its abstract states: "The invention is directed to a gutter system for channeling rainwater from a building. The gutter system includes gutter sections that are interconnected with joint members having gaskets incorporated thereon. Each gutter section has a substantially hollow space defined between inner and outer walls that are spanned by a plurality of ribs."

[0006] JPH0532549U in its description in [0007] (machine translated) states: "For this reason, the inner surface connection structure of the eaves gutter according to the present invention is connected by abutting the ends of the eaves gutter bodies having curved flow paths having a substantially U-shaped cross section. However, it has an inner surface connection structure of an eaves gutter in which an inside joint is attached to the surface of the flow path of the connection portion, and a locking portion obtained by folding back the edge of the inside joint is inserted into the upper edges on both sides of the eaves gutter body. The inside joint is a plate-like material having an elastic portion that has a groove portion to support and tries to return to the flat plate state, and both edges are folded back to form a locking portion, and the locking portion is formed in the groove portion of the eaves gutter main body. An attempt is made to achieve the above object by a configuration characterized in that the entire back surface of the inside joint is crimped to the surface of the flow path by the elasticity when the inside joint is inserted by pressing."

[0007] JPS638317U seems to relate to coupling of gutter ends using complementary end parts that abut (figure 1-8). A (machine) translation of the description states: "The connecting device for an eaves gutter is characterized in that a sealing material filling space for holding a sealing material is formed between both connecting members when the projecting part of the other connecting member is fitted into a recessed part provided in one connecting member."

[0008] DE9207858U according its introduction seems to relate to "Roof gutters for buildings or the like usually comprise zinc-made gutter bodies, generally semicylindrical, and a plurality of gutter holders, which consist of front receiving sections curved in the shape of a semicircle and rear mounting sections running substantially straight.

[0009] In this case, the mounting sections are each fastened to an adjacent roof rafter and the gutter bodies are then placed with their undersides on the receiving sections which are curved in the shape of a semicircle and fastened by means of fastening tabs which are fitted to them and can be bent over."

[0010] US4727689 in its abstract states: "A rain gutter which is formed of a one-piece sheet of material and includes terminal flanges. A clip member secured to the building side wall includes a channel into which the gutter terminal flanges are restrictively fitted to suspend the gutter below the building roof. The gutter top wall includes openings to allow moisture to be drained, while preventing entry of debris which could clog the gutter and downspout."

[0011] The gutter that was introduced at that time lacked flexibility in design and use.

Summary of the invention

[0012] A disadvantage of prior art is that most gutters from synthetic material lack functionality and can not be applied on many known buildings.

[0013] Hence, it is an aspect of the invention to provide an alternative gutter assembly, which preferably further at least partly obviates one or more of above-described drawbacks.

[0014] There is provided a gutter assembly of claim 1.

[0015] In particular, the mounting rail allows a sliding degree of motion of the gutter with respect to the mounting rail and thus a building in the longitudinal direction of the gutter.

[0016] The gutter is produced in lengths of up to 8 meters. Such a length can easily be transported to a site of use. Usually, a gutter of this type will be produced in an extrusion process. This type of process is well known and results in a double walled, self supporting gutter. Attachment of such a gutter can be simplified and swifter. Furthermore, the attachment allows gutter ends to slide when mounted. This makes the mounting able to handle dynamic situations, like working of building parts, temperature changes, and the like.

[0017] Furthermore, the production allows for incorporating additional features like additional rails, or other coupling means that allows attachment or coupling of further parts like lists, aesthetic profiles, reinforcement parts, braces.

[0018] The current gutter is also referred to as synthetic material gutter or plastic gutter. The gutter is in particular made of synthetic material that can be extruded. In order to make the gutter better weathering resistant, the synthetic gutter can be made of polyvinylchloride (PVC).

[0019] In an embodiment, the gutter is produced by additive manufacturing. This is also referred to as "3D printing". In this method, each time a new layer is added, thus producing a length of gutter.

[0020] According to the invention, each attachment rail comprises a mounting recess in said outer wall part, and each mounting rail comprises a mounting ledge fitting said attachment rail.

[0021] Each mounting recess comprises an undercut groove, and said mounting rail comprises a U-shaped edge fitting, in particular snap-fitting, into said undercut groove of said mounting recess.

[0022] In an embodiment, the inner gutter wall comprises a gutter bottom, a building side inner wall extending from said gutter bottom and an opposite outer side inner wall extending from said gutter bottom, and said gutter comprising an building side gutter edge and an opposite outer gutter edge.

[0023] In an embodiment, the gutter assembly further comprising a gutter coupling assembly for coupling two gutters with their ends for providing a continuous gutter.

[0024] In an embodiment, the gutter coupling assembly comprises:

- a first gutter coupling part comprising a gutter attaching end for attaching to said end of one of said two gutters, and a first closing flange, and
- a second gutter coupling part comprising a gutter attachment end for attaching to said end of the other of said two gutters, and gutter coupling sealing flange complementary with said first closing flange to provide a water tight coupling.

[0025] In an embodiment, said first gutter coupling part comprising a gutter attaching end for attaching to said end of one of said two gutters, and a first coupling flange.

[0026] In an embodiment, said second gutter coupling part comprising a gutter attachment end for attaching to said end of the other of said two gutters, and gutter coupling sealing flange shaped for in operation allowing said first coupling flange to slide over said gutter coupling sealing flange.

[0027] In an embodiment, the gutter attachment end of said first and said second gutter coupling part each comprise a coupling plate substantially matching a cross section of said gutter, for attaching, in particular fixing, to a gutter end, for instance fixing using adhesive.

[0028] In an embodiment, the gutter attachment end further comprises a gutter coupling attachment flange comprising an outer surface matching an inner surface of the gutter for allowing coupling, in an embodiment attaching, the gutter coupling attachment flange and said inner surface of the gutter.

[0029] In an embodiment, the coupling flange has a gutter side, and said second sealing flange has a sealing surface which sealing surface and gutter side are sealingly flush with an inner surface of the gutter attachment flange.

[0030] According to the invention, the gutter is produced in a process selected from extrusion and additive manufacturing, and which is substantially from a polymer material, preferably from PVC.

[0031] In an embodiment, the gutter assembly further comprises a water sensor for providing a warning signal in case of gutter clogging.

[0032] In an embodiment, the water sensor comprises a sensing element for detecting a water level in said gutter, in an embodiment extending into said gutter up to a predefined height above a gutter lower inner wall for detecting water above a predefined water height level (wh) in said gutter.

[0033] In an embodiment, the water sensor further comprises an attachment part for attaching, in particular snapping, said water sensor onto said gutter.

[0034] In an embodiment, the water sensor comprises a power supply, in particular a photovoltaic element (101), for providing operational electrical power to said water sensor.

[0035] In an embodiment, the water sensor comprises a wireless transmitter for transmitting a signal when a water level is detected.

[0036] Optionally said water sensor comprises :

- an attachment end for attaching said water sensor on a gutter;
- a power source;
- a water detector coupled to said attachment end for detecting a predefined water level in a gutter once attached to said gutter;
- a wireless transmitter, and
- a processor for running a computer program.

[0037] In an embodiment, the computer program when receiving a first signal from the water detector, and when receiving a further signal from said water detector at a predetermined time from said first signal, issues a gutter clogged signal via said wireless transmitter. In an embodiment, said gutter clogged signal is issued after receiving several signals from said water detector at predetermined time intervals.

[0038] There is further provided in combination with the gutter assembly of claim 1, a coupling assembly for coupling ends of gutter together allowing water to flow between the ends of gutter, wherein said gutter attachment end of said first and said second gutter coupling part each comprise a coupling plate substantially matching a cross section of said gutter, for attaching, in particular fixing, to a gutter end, for instance fixing using adhesive.

[0039] The terms "upstream" and "downstream" relate to an arrangement of items or features relative to the flow of water from a source position to a drain position. For instance, in the gutter water flows from an upstream end to a downstream end.

[0040] The term "substantially" herein, such as in "substantially rectangular" or in "substantially consists", will be understood by the person skilled in the art. The term "substantially" may also include embodiments with "entirely", "completely", "all", etc. Hence, in embodiments the adjective substantially may also be removed. Where applicable, the term "substantially" may also relate to 90% or higher, such as 95% or higher, especially 99% or higher, even more especially 99.5% or higher, including 100%. The term "comprise" includes also embodiments wherein the term "comprises" means "consists of".

[0041] The term "functionally" will be understood by, and be clear to, a person skilled in the art. The term "substantially" as well as "functionally" may also include embodiments with "entirely", "completely", "all", etc. Hence, in embodiments the adjective functionally may also be removed. When used, for instance in "functionally parallel", a skilled person will understand that the adjective "functionally" includes the term substantially as explained above. Functionally in particular is to be understood to include a configuration of features that allows these features to function as if the adjective "functionally" was not present. The term "functionally" is intended to cover variations in the feature to which it refers, and which variations are such that in the functional use of the feature, possibly in combination with other features it relates to in the invention, that combination of features is able to operate or function. For instance, if an antenna is functionally coupled or functionally connected to a communication device, received electromagnetic signals that are receives by the antenna can be used by the communication device. The word "functionally" as for instance used in "functionally parallel" is used to cover exactly parallel, but also the embodiments that are covered by the word "substantially" explained above. For instance, "functionally parallel" relates to embodiments that in operation function as if the parts are for instance parallel. This covers embodiments for which it is clear to a skilled person that it operates within its intended field of use as if it were parallel.

[0042] Furthermore, the terms first, second, third and the like in the description and in the claims, are used for distinguishing between similar elements and not necessarily for describing a sequential or chronological order. It is to be understood that the terms so used are interchangeable under appropriate circumstances and that the embodiments of the invention described herein are capable of operation in other sequences than described or illustrated herein.

[0043] The devices or apparatus herein are amongst others described during operation. As will be clear to the person skilled in the art, the invention is not limited to methods of operation or devices in operation, but is defined by the claims.

[0044] It should be noted that the above-mentioned embodiments illustrate rather than limit the invention, and that those skilled in the art will be able to design many alternative embodiments without departing from the scope of the appended claims. In the claims, any reference signs placed between parentheses shall not be construed as limiting the claim. Use of the verb "to comprise" and its conjugations does not exclude the presence of elements or steps other than those stated in a claim. The article "a" or "an" preceding an element does not exclude the presence of a plurality of such elements. The invention may be implemented by means of hardware comprising several distinct elements, and by means of a suitably programmed computer. In the device or apparatus claims enumerating several means, several of these means may be embodied by one and the same item of hardware. The mere fact that certain measures are recited in mutually different dependent claims does not indicate that a combination of these measures cannot be used to advantage.

[0045] The various aspects discussed in this patent can be combined in order to provide additional advantages, within the limits defined by the claims.

[0046] Furthermore, some of the features can form the basis for one or more divisional applications.

Brief description of the drawings

[0047] Embodiments of the invention will now be described, by way of example only, with reference to the accompanying schematic drawings in which corresponding reference symbols indicate corresponding parts, and

in which:

Figure 1 schematically depicts a perspective view of a gutter;
Figure 2 shows an end view of the gutter of figure 1;
Figure 3 a perspective view of a gutter with end part;
Figure 4 the embodiment of figure 3 from opposite viewpoint;
Figure 5 a perspective view of a corner of a gutter, showing two gutter ends are coupled in a mitre joint;
Figure 6 shows a corner gutter with a transport brace;
Figure 7 shows a gutter while a reinforcement brace is being attached;
Figure 8 a perspective view of figure 7;
Figure 9 a cross sectional view of the gutter of figure 7 with attached reinforcement brace;
Figure 10 a perspective view of figure 9;
Figure 11 a perspective view of two gutter ends according to figure 1 with gutter coupling assembly, and
Figure 12 the gutter of figure 1 with water sensor.

[0048] The drawings are not necessarily on scale

Description of preferred embodiments

[0049] Figure 1 schematically depicts a perspective view of a gutter 1, and figure 2 shows a side view. The gutter 1 is an extruded gutter or is manufactured using additive manufacturing, also referred to as 3D printing.

[0050] The gutter 1 is double walled, comprising an inner wall 2, and outer wall 3, and reinforcing ribs 4 connecting the inner wall 2 and outer wall 3. The inner wall 2 and outer wall 3 connect at opposite gutter edges 9. The gutter 1 is generally channel shaped and has a gutter bottom 8. The gutter 1 has a side that is in use mounted against or directed towards a building. This side is indicated with B, Building side. The opposite side is indicated O, outer side.

[0051] The gutter 1 is elongated or extends in longitudinal direction. Connected to and extending from the gutter bottom 8 are a building side inner wall 11 and an outer side inner wall 10. The building side inner wall 11, outer side inner wall 10, and gutter bottom 8 together define the channel shape for receiving water and guiding the received water away to a drain pipe.

[0052] The gutter 1 comprises several grooves, rails, recesses and flanges extending in longitudinal direction. These grooves, rails, flanges and recesses provide attachment, mounting and/or coupling parts for various other parts.

[0053] The gutter 1 has a building side outer wall 5. This building side outer wall 5 here comprises two parallel mounting recesses 6 providing gutter attachment rails. In this embodiment these provide a one-sided undercut groove 12. The undercutting 12 provides the mounting recess 6 with a gutter mounting flange 13. The gutter mounting flange 13 extends in gutter bottom 8 direction.

[0054] The gutter 1 comprises two mounting strips 7, also called mounting rails 7, one for each mounting recess 6. Mounting strip 7 on one side has a U-shape side which proves the mounting strip 7 with a mounting strip/rail flange 14. The dimensions of the mounting recess 6, undercutting 12 and gutter mounting flange 13 on one side and the U-shape side and mounting strip flange 14 are mutually designed and dimensioned to provide a snap fit when mounting strip flange 14 is introduced into the undercutting 12 as depicted in figure 2. For better mounting and fixing, the mounting strip flange 14 extends away from the strip body. Thus, mounting rail flange 14 and mounting rail body 15 are not parallel. The angle is between 5 and 20 degrees. In particular between 10 and 20 degrees.

[0055] In an embodiment, the end of gutter mounting flange 13 is thickened in the direction of the building side inner wall 11. Furthermore, in this embodiment, the flaring out or extending of the mounting strip flange 14 starts about one third of its width. When the gutter mounting flange 13 enters the U-shaped side of the mounting strip, it pushes the flange a little away from the mounting strip 7 and against a wall of the mounting recess 6. This provides fixation.

[0056] In the illustrated embodiment, the mounting strip 7 runs along substantially the full length of the gutter 1. In this way, a secure and aligned mounting is ensured. It is also possible to use shorter ends of mounting strip 7, but in such instances, mutual alignment of these ends of mounting strip 7 is required. According to the invention, the gutter 1 has two mounting recesses 6. This allows either more firm fixation, or can provide two different mounting options.

[0057] Using for instance a screw through the mounting strip/rail body 15, a mounting rail 7 can be attached or fixed to a building. If a screw head extends, it will fall in the additional recess above the mounting recess 6. The mounting rail 7 can be made from synthetic material. It may also be made from aluminium.

[0058] The gutter 1 comprises here two tubular profiles 16, here having a rectangular cross section. The tubular profiles 16 run along the length of a gutter. They can be used for receiving a coupling rod as illustrated in figure 5. Such a mounting rod can have a rectangular cross section, preferably matching the tubular profile 1 cross section. This can provide additional fixation of gutter parts. The outer side bottom wall 25, the inner side of it, provides one wall of the tubular profile 16. The tubular profiles 16 are provide at/near opposite lower corners of the gutter 1.

[0059] In the building side outer wall 5, the gutter 1 further comprises a plate groove 22. Plate groove 22 is provided for receiving an edge of a board or panel, for instance a board covering an overhang of a roof.

[0060] The gutter 1 further comprises an inner flange 23 extending inward and comprising an end bending towards the gutter bottom 8. This in fact provides an undercut rail.

[0061] Gutter 1, or better the gutter edge 9 at the outer

side of the gutter 1, is further provided with an outer side gutter edge groove 17.

[0062] The gutter edge 9 at the outer side of gutter 1 has various features that allow mounting/snapping of various decorative strips. These decorative strips and trims and rails are both decorative and functional. For instance a snap-fit cornice 18 is depicted in figure 1 and 2. A further snap fit cornice decorative strip 19 covers the top of the cornice 18. The embodiment of figures 1 and 2 can be provided with a gutter cladding profile 28 for covering a further attachment rail 29 and providing the gutter with a custom colour. The gutter cladding profile can further be provided with a colouring foil for allowing further custom colours. The snap fit cornice decorative strip 19 covers an edge of the gutter cladding profile 28, so as to fix it and clear its edge of sight..

[0063] The gutter 1 has a thickness of the inner wall 2 and outer wall 3 of 1-4 mm. In particular the thickness is 1.5-3 mm. The ribs 4 have a thickness of between 0.2-2 mm. In particular, the thickness of the ribs is 0.5-1.5 mm. It was found that this provides an optimal trade off between raw material used and strength. It allows single gutter lengths of 8 meters long. The recesses, profiles and flanges are functional for attaching parts, and provide additional strength and reinforcement.

[0064] Figures 3 and 4 show perspective views from opposite sides. Depicted is an gutter closing piece 30 that can be fitted to an end of the gutter 1 in order to close it. In the figures 3 and 4, furthermore a gutter coupling piece 20 is depicted, for coupling two ends of gutter butted together.

[0065] Gutter closing piece 30 comprises an end plate 31 matching the shape of the cross section of a gutter 1. A closing piece flange 32 extends from the end plate 31. The end plate 31 at the closing piece side in an embodiment is provided with adhesive, for instance resulting from an applied double sided tape end. The shape of the closing piece flange is adapted to tightly fit the building side inner wall 11, the outer side inner wall 10 and the gutter bottom 8. In an embodiment, the closing piece flange 32 has a coupling surface which in use contacts the inner surface of the gutter 1 for providing additional attachment or sealing. In an embodiment, the coupling surface is provided with a rubber sealing strip. In used, this rubber sealing strip is between the coupling surface and the inner surface of the gutter 1. Usually, such a rubber strip will be slightly compressed for improved sealing. In another embodiment, the coupling surface is provided with an adhesive for attaching the closing piece flange 32 to the inner surface of the gutter 1.

[0066] In figures 5 and 6, it is illustrated how two ends of gutter 1 or gutter ends are connected using a mitre joint. Jointing rods 40 that are here 90 degree angles, i.e., corresponding to the angle of the mitre joint, having a cross section dimensioned and fitting the tubular profiles 16 are inserted in the tubular profiles 16 of one of the gutter ends. Double sided tape end is fitted to one of the butt ends of a gutter end. Next, the gutter ends are pressed together with the other ends of the joining rods 40 inserting the tubular profiles 16 of the opposite gutter end. Once pressed together, a tape end can applied to the inner surface or channel side and over the mitre joint 26.

[0067] For additional strength, a further joining rod 40 can be fitted in the joined outer side gutter edge groves 17. Yet a further joining rod 40 can be fitted in the building side gutter edge groove 21.

[0068] In figure 6, a corner reinforcement bar 50 is shown. This bar can for instance be applied when a ready-to-fit gutter is transported to a building site, The corned reinforcement bar 50 at its ends comprises fitting ends that fit into the respective building side gutter edge groove. These fitting ends 51 are at an opposite angle with respect to a longitudinal axis of the reinforcement bar 50. In case of a 90 degree angle of the gutter ends, both fitting ends are at 45 degrees and thus mutually at 90 degrees. Usually, the corner reinforcement bar 50 is temporary.

[0069] In figures 7-10, application of a reinforcement brace 60 for a gutter 1 is depicted. Such a reinforcement brace 60 can be applied at for instance 50 cm interspacing along the length of a gutter 1. This reinforces a gutter 1, for instance in case of heavy snowfall. In an embodiment, these reinforcement braces can be applied in winter. Gutter reinforcement brace 60 comprises a gutter brace lever 61 and a gutter brace bar 62. Gutter brace lever 61 is hingingly connected to gutter brace bar 62. The connection allows the gutter brace lever 62 and the gutter brace bar 61 to form a scissor mechanism. The gutter reinforcement brace 60 can clamp on the inner flange 23 described earlier on/near one gutter edge 9 and clamp on a flange and top surface on the opposite gutter edge. The length of the gutter reinforcement brace 60 is dimensioned to the width of the gutter 1. In this embodiment, when bringing the gutter brace lever 61 and gutter brace bar in line, one end of the gutter brace lever 61 engages the inner flange 23 at the bottom side and the corresponding end of the gutter brace bar 62 engages the opposite side of the inner flange 23. The opposite end of the gutter brace lever 61 engages the upper side of gutter edge 9 and the corresponding end of the gutter brace bar 61 engages a further inner flange 26. It is evident that operation can be reversed, with the gutter reinforcement brace 60 rotated.

[0070] When in line, the gutter brace bar 62 and gutter brace lever 61 snap together. When a gutter gets loaded with snow, for instance, the gutter 1 will have additional reinforcement.

[0071] The depicted gutter 1 of these embodiments has an alternative gutter edge strip 27. It snaps onto the gutter edge 9 via a small longitudinally extending slot and notch, and a flange snapping behind a profile. The gutter edge strip 27 has a decorative aspect, and provides an engagement surface for the gutter brace lever engagement surface 64.

[0072] In figure 11, a gutter coupling assembly 20A,

20B is depicted. Such a gutter coupling assembly 20A, 20B allows a (longitudinal, water) coupling of two gutter ends 1. The depicted gutter ends (or "ends of gutter (1)") 1 correspond to the gutter 1 of figure 1. In particular, it was found that when coupling longer gutter ends, for instance for providing a continuous gutter along several houses, the dynamics of the environment and of the buildings/-houses may put stress on such a (water) coupling. Dotted lines visualize the continuous coupling. The provided coupling assembly 20A, 20B allows a longitudinal change in gutter end distance. In practice, a gutter (1) can be 3-15 meters long, in practice a gutter (1) can be 3-8 meter long. In extreme circumstances, lengths due to temperature changes may change 1-5 cm.

[0073] In the current embodiment, the gutter coupling assembly 20A, 20B comprises two cooperating gutter coupling parts 20A, 20B. Each of the gutter coupling parts 20A, 20B has a gutter coupling means for coupling the respective gutter coupling part 20A, 20B to a gutter end. In the depicted embodiment, the gutter coupling parts 20A, 20B comprise a gutter coupling attachment flange 43.

[0074] Extending at opposite side of each gutter coupling part 20A, 20B, each gutter coupling part 20A, 20B comprises a complementary coupling means for coupling the gutter coupling parts 20A, 20B. In the current embodiment, one gutter coupling part 20A comprises a gutter coupling flange 41 and the complementary gutter coupling part 20B in the depicted embodiment comprises a gutter coupling sealing flange 42. This sealing flange comprises a sealing part comprising in the depicted embodiment a trench for holding a sealing rubber strip.

[0075] The outer surface of the gutter coupling flange 41 slides over the inner side of the gutter coupling sealing flange 42 is a (water) sealing manner.

[0076] In an embodiment, the gutter coupling means of the gutter coupling parts 20A, 20B each comprises a gutter coupling plate 40. The gutter coupling plates have a shape matching a cross section of the gutter (1). For attaching each of the gutter coupling parts 20A, 20B to its respective gutter (1), a connecting side of the gutter coupling plates 40 can be provided with an adhesive of for instance with a double sided tape part. With the gutter coupling plates 40 attached to its respective gutter 1, the gutter coupling attachment flanges 43 rest with a gutter side against the inner surface of its gutter 1. The dotted arrows extending try to visualize this. The gutter side of the gutter coupling attachment flange 43 can be attached to the inner surface of the gutter (1) by means of an adhesive or a double sided tape. Alternative, the gutter side of the gutter coupling attachment flange 43 can be provided with a sealing rubber strip. In general, for providing sealing, gutter side of the gutter coupling attachment flange 43 matches the inner surface of the gutter (1). Usually, the gutter coupling attachment flange 43 extends between 0.5 and 5 cm. In general, it extends between 1 and 3 cm.

[0077] In the depicted embodiment, the gutter coupling plate 40 on its connecting side has the gutter coupling attachment flange 43 attached to it, extending from it. At its opposite side, the gutter coupling plate 40 has attached to it the gutter coupling flange 41. For the gutter coupling part 20B, the cutter coupling sealing flange 42 is attached or injected onto or together with the gutter coupling plate 40. It is provided on the gutter coupling plate 40 in such a way that the sealing surface of the gutter coupling sealing flange 42 is functionally continuous or flush with an inner surface of the gutter coupling attachment flange 43. In the depicted embodiment, the gutter coupling sealing flange 42 provides a trench for holding a rubber sealing strip (not depicted).

[0078] For allowing the gutter coupling flange 41 to slide over the gutter coupling sealing flange 42 (in fact, its sealing surface), an gutter side surface of the gutter coupling flange 41 is flush with the inner surface of gutter coupling attachment flange 43, or even a little elevated to be able to slide. The gutter coupling flange can extend between 5-10 cm from the gutter coupling plate 40.

[0079] The gutter coupling assembly in an embodiment further comprises the earlier-described gutter coupling cladding profile 28. Usually, it will be around 5-30 cm long. It is to cover the gap (distance between adjacent gutter ends) filled with the gutter coupling parts 20A, 2B. It will be attached to one of the gutter ends 1. For instance, it may be attached using adhesive, of for instance via a mechanical connection, for instance using screws.

[0080] In figure 12, an embodiment of a gutter water sensor 100 is depicted, which is used with the gutter assembly of claim 1. Water sensor 100 comprises a housing 102 allowing attachment to the gutter 1. In the current embodiment, the housing comprises an attachment means for snap-coupling on further inner flange or rail 26. The housing 102 may for instance snap fit on the rail 26 and the gutter edge strip 27. Alternatively, the water sensor can be attached to the gutter 1 via adhesive or a mechanical attachment lite s screw.

[0081] The water sensor comprises a sensor part 103 that indicates when a water level reaches a predetermined height wh. The water sensor issues a signal when this water level wh remains for a predetermined amount of time. For instance, it can measure starting from the first measurement time and measure at fixed time intervals to determine if the water level wh remains. If the water level wh remains at or above the pre-set water level wh, the water sensor can issue a wireless signal indicating clogging of the gutter 1. The water sensor 100 comprises a power source, for instance comprising a photovoltaic panel 101. The wireless signal mar be transmitted using Bluetooth, Wi-Fi, ZigBee, or any similar signal processing method and protocol. The sensor part 103 is for instance set at a water level wh.

[0082] It will also be clear that the above description and drawings are included to illustrate some embodiments of the invention, and not to limit the scope of protection, which is defined by the claims. Starting from this disclosure, many more embodiments will be evident

to a skilled person.

Reference numbers

[0083]

1 gutter
2 inner gutter wall
3 outer gutter wall
4 reinforcing rib
5 building sided outer wall
6 mounting recess
7 mounting rail
8 gutter bottom
9 gutter edge
10 outer side inner wall
11 building side inner wall
12 undercutting (of mounting recess)
13 gutter mounting flange
14 mounting rail flange
15 mounting rail body
16 rectangular tubular profile
17 outer side gutter edge groove
18 cornice
19 cornice decorative strip
20A, 20B gutter coupling part
21 building side gutter edge groove
22 plate/panel groove
23 Inner flange
24 outer side outer wall
25 outer side bottom wall
26 Further inner flange
27 gutter edge strip
28 gutter coupling cladding profile
29 gutter attachment rail
30 gutter closing piece
31 end plate
32 gutter closing piece flange/collar
40 gutter coupling plate
41 gutter coupling flange/collar
42 gutter coupling sealing flange/collar
43 gutter coupling attachment flange/collar
50 corner reinforcement bar
51 reinforcement bar fitting end
60 gutter brace
61 gutter brace lever
62 gutter brace bar
63 gutter brace bar engagement flange
64 gutter brace lever engagement surface
65 gutter brace lever engagement flange
66 gutter brace bar engagement surface
70 Adhesive surfaces
100 water sensor
101 solar panel
102 housing comprising processor and wireless transmitter
103 water sensing end
B Buiding side
O Outer side
wh water height

Claims

1. A gutter assembly, comprising a gutter (1) which is double walled, and comprises an inner (2) and an outer wall (3) and ribs (4) connecting said inner and outer wall (2, 3), providing a functionally self supporting gutter (1), wherein said gutter (1) is

   produced in a process selected from extrusion and additive manufacturing, and is substantially from a polymer material, preferably from PVC, the gutter assembly further comprising:

   - two attachment rails extending along a length and at a building side outer wall part (5) of the gutter (1), the building side outer wall part (5) comprising two parallel mounting recesses (6) providing the attachment rails;
   - the mounting recesses (6) each provided with a one-sided undercut groove (12) providing the mounting recess (6) with a gutter mounting flange (13);
   - two mounting rails (7) each comprising a mounting flange (14) fitting one of said attachment rail and comprising an attachment end (15) for attaching said mounting rail (7) to a building, and

   wherein each mounting rail (7) comprises a U-shaped edge comprising said mounting flange (14) for fitting, in particular snap-fitting, into said undercut groove (12) of one said mounting recess (6).

2. The gutter (1) assembly according to any one of the preceding claims, wherein said inner gutter wall (2) comprises a gutter bottom (8), a building side inner wall (11) extending from said gutter bottom (8) and an opposite outer side inner wall (10) extending from said gutter bottom (8), and said gutter (1) comprising an building side gutter edge (9) and an opposite outer gutter edge (9).

3. The gutter (1) assembly according to any one of the preceding claims, further comprising a gutter coupling assembly for coupling two gutters (1) with their ends for providing a continuous gutter.

4. The gutter (1) assembly of claim 3, wherein said gutter coupling assembly comprises:

   - a first gutter coupling part (20A) comprising a gutter attaching end (43) for attaching to said

end of one of said two gutters (1), and a first closing flange (41), and
- a second gutter coupling part (20B) comprising a gutter attachment end (43) for attaching to said end of the other of said two gutters (1), and gutter coupling sealing flange (42) complementary with said first closing flange (41) to provide a water tight coupling.

5. The gutter (1) assembly of claim 4, wherein:

- said first gutter coupling part (20A) comprising a gutter attaching end (43) for attaching to said end of one of said two gutters (1), and a first coupling flange (41), and
- said second gutter coupling part (20B) comprising a gutter attachment end (43) for attaching to said end of the other of said two gutters (1), and gutter coupling sealing flange (42) shaped for in operation allowing said first coupling flange (41) to slide over said gutter coupling sealing flange (42).

6. The gutter (1) assembly of the previous claim, wherein said gutter attachment end of said first and said second gutter coupling part (20A, 20B) each comprise a coupling plate (40) substantially matching a cross section of said gutter (1), for attaching, in particular fixing, to a gutter end, for instance fixing using adhesive.

7. The gutter (1) assembly of any one of claims 4-6, wherein said gutter attachment end (43) further comprises a gutter coupling attachment flange (43) comprising an outer surface matching an inner surface of the gutter (1) for allowing coupling, in an embodiment attaching, the gutter coupling attachment flange (43) and said inner surface of the gutter (1).

8. The gutter (1) assembly of any one of claims 4-7, wherein said coupling flange (41) has a gutter side, and said second sealing flange (42) has a sealing surface which sealing surface and gutter side are sealingly flush with an inner surface of the gutter attachment flange (43).

9. The gutter assembly according to any one of the preceding claims, further comprising a water sensor (100) for providing a warning signal in case of gutter clogging.

10. The gutter assembly of claim 9, wherein said water sensor (100) comprises a sensing element (103) for detecting a water level in said gutter, in an embodiment extending into said gutter (1) up to a predefined height above a gutter lower inner wall (2) for detecting water above a predefined water height level (wh) in said gutter (1), said water sensor (100) further comprises:

- an attachment part for attaching, in particular snapping, said water sensor onto said gutter(1);
- a power supply, in particular a photovoltaic element (101), for providing operational electrical power to said water sensor;
- a wireless transmitter for transmitting a signal when a water level is detected.

Patentansprüche

1. Rinnenanordnung, die eine Rinne (1) umfasst, die doppelwandig ist und umfasst

eine innere (2) und eine äußere Wand (3) und Rippen (4), die die innere und die äußere Wand (2, 3) verbinden und eine funktionell selbsttragende Rinne (1) bilden, wobei
die Rinne (1) hergestellt wird in einem Verfahren hergestellt wird, das aus Extrusion und additiver Fertigung ausgewählt ist, und im Wesentlichen einem Polymermaterial, vorzugsweise PVC, umfasst, wobei die Rinnenanordnung
ferner umfasst:

- zwei Befestigungsschienen, die sich entlang einer Länge und an einem bauseitigen Außenwandteil (5) der Rinne (1) erstrecken, wobei das bauseitige Außenwandteil (5) zwei parallele Montageausnehmungen (6) aufweist, die die Befestigungsschienen bereitstellen;
- wobei die Montageausnehmungen (6) jeweils mit einer einseitig hinterschnittenen Nut (12) versehen sind, die die Montageausnehmung (6) mit einem Rinnenmontageflansch (13) versieht;
- zwei Montageschienen (7), die jeweils einen Montageflansch (14) aufweisen, der zu einer der Befestigungsschienen passt und ein Befestigungsende (15) zum Befestigen der Montageschiene (7) an einem Gebäude aufweist, und

wobei jede Montageschiene (7) einen U-förmigen Rand aufweist, der den Montageflansch (14) zum Einpassen, insbesondere zum Einschnappen, in die hinterschnittene Nut (12) einer der Montageaussparungen (6) aufweist.

2. Dachrinnenanordnung (1) nach einem der vorhergehenden Ansprüche, wobei die innere Dachrinnenwand (2) einen Dachrinnenboden (8), eine bauseitige Innenwand (11), die sich von dem Dachrinnenboden (8) aus erstreckt, und eine gegenüberliegende äußere Innenwand (10), die sich von dem Dach-

rinnenboden (8) aus erstreckt, umfasst, und wobei die Dachrinne (1) einen bauseitigen Dachrinnenrand (9) und einen gegenüberliegenden äußeren Dachrinnenrand (9) umfasst.

3. Die Rinnenanordnung (1) nach einem der vorhergehenden Ansprüche, die ferner eine Rinnenverbindungsanordnung zum Verbinden zweier Rinnen (1) mit ihren Enden, um eine durchgehende Rinne zu bilden.

4. Rinnenbaugruppe (1) nach Anspruch 3, wobei die Rinnenkupplungsbaugruppe umfasst:

- ein erstes Rinnenkupplungsteil (20A), das ein Rinnenbefestigungsende (43) zur Anbringen an dem Ende einer der beiden Rinnen (1) und einen ersten Verschlussflansch (41) umfasst, und
- ein zweites Dachrinnenkupplungsteil (20B), das ein Dachrinnenbefestigungsende (43) zum Befestigen an dem Ende der anderen der beiden Dachrinnen (1) und einen Dachrinnenkupplungsdichtungsflansch (42) umfasst, der zu dem ersten Verschlussflansch (41) komplementär ist, um eine wasserdichte Kupplung bereitzustellen.

5. Die Rinnenanordnung (1) nach Anspruch 4, wobei:

- das erste Rinnenkupplungsteil (20A) ein Rinnenbefestigungsende (43) zum Befestigen an dem Ende einer der beiden Rinnen (1) und einen ersten Kupplungsflansch (41) aufweist, und
- das zweite Dachrinnenkupplungsteil (20B) ein Dachrinnenbefestigungsende (43) zum Befestigen an dem Ende der anderen der beiden Dachrinnen (1) und einen Dachrinnenkupplungsdichtungsflansch (42) umfasst, der so geformt ist, dass er im Betrieb das Gleiten des ersten Kupplungsflansches (41) über den Dachrinnenkupplungsdichtungsflansch (42) ermöglicht.

6. Dachrinnenanordnung (1) nach dem vorhergehenden Anspruch, wobei das Dachrinnenbefestigungsende des ersten und des zweiten Dachrinnenkupplungsteils (20A, 20B) jeweils eine Kupplungsplatte (40) umfasst, die im Wesentlichen mit einem Querschnitt der Dachrinne (1) übereinstimmt, um sie an einem Dachrinnenende zu befestigen, insbesondere zu fixieren, zum Beispiel unter Verwendung von Klebstoff.

7. Dachrinnenanordnung (1) nach einem der Ansprüche 4 bis 6, wobei das Dachrinnenbefestigungsende (43) ferner einen Dachrinnenkupplungsbefestigungsflansch (43) umfasst, der eine Außenfläche aufweist, die mit einer Innenfläche der Dachrinne (1) übereinstimmt, damit der Dachrinnenkupplungsbefestigungsflansch (43) und die Innenfläche der Dachrinne (1) gekoppelt, in einer Ausführungsform befestigt, werden können Innenfläche der Rinne (1) zu ermöglichen.

8. Rinnenanordnung (1) nach einem der Ansprüche 4 bis 7, wobei der Kupplungsflansch (41) eine Rinnenseite hat und der zweite Dichtungsflansch (42) eine Dichtungsfläche hat, die mit einer Innenfläche des Rinnenbefestigungsflansches (43) abdichtend bündig sind.

9. Die Rinnenbaugruppe nach einem der vorangehenden Ansprüche umfasst ferner einen Wassersensor (100) zur Bereitstellung eines Warnsignals im Falle einer Rinnenverstopfung.

10. Die Rinnenanordnung nach Anspruch 9, wobei der Wassersensor (100) ein Sensorelement (103) zum Erfassen eines Wasserpegels in der Rinne umfasst, das sich in einer Ausführungsform in die Rinne (1) bis zu einer vordefinierten Höhe oberhalb einer unteren Rinneninneninnenwand (2) erstreckt, um Wasser oberhalb eines vordefinierten Wasserhöhenniveaus (wh) in der Rinne (1) zu erfassen, wobei der Wassersensor (100) ferner umfasst:

- ein Befestigungsteil zum Befestigen, insbesondere Einrasten, des Wassersensors an der Dachrinne (1);
- eine Stromversorgung, insbesondere ein photovoltaisches Element (101), um den Wassersensor mit elektrischer Betriebsenergie zu versorgen;
- einen drahtlosen Sender zum Übertragen eines Signals, wenn ein Wasserstand erfasst wird.

Revendications

1. Ensemble de gouttières comprenant une gouttière (1) à double paroi, comprenant une paroi intérieure (2) et une paroi extérieure (3) et des nervures (4) reliant lesdites parois intérieure et extérieure (2, 3), ce qui donne une gouttière (1) fonctionnellement autoportante, dans laquelle ladite gouttière (1) est

produite par un procédé choisi parmi l'extrusion et la fabrication additive, et est essentiellement à partir d'un matériau polymère, de préférence du PVC, l'assemblage de la gouttière comprenant en outre

- deux rails de fixation s'étendant sur une longueur et au niveau d'une paroi exté-

rieure côté bâtiment de la gouttière (1), la partie de la paroi extérieure côté bâtiment (5) comprenant deux évidements de montage parallèles (6) fournissant les rails de fixation;
- les évidements de montage (6) sont chacun pourvus d'une rainure de contre-dépouille unilatérale (12) qui fournit à l'évidement de montage (6) une bride de montage de gouttière (13);
- deux rails de montage (7) comprenant chacun une bride de montage (14) s'adaptant à l'un de ces rails de fixation et comprenant une extrémité de fixation (15) pour fixer ledit rail de montage (7) à un bâtiment, et

dans lequel chaque rail de montage (7) comprend un bord en forme de U comprenant ladite bride de montage (14) pour s'adapter, en particulier par encliquetage, à ladite rainure de contre-dépouille (12) de l'un desdits évidements de montage (6).

2. Ensemble de gouttière (1) selon l'une quelconque des revendications précédentes, dans lequel ladite paroi intérieure de gouttière (2) comprend un fond de gouttière (8), une paroi intérieure côté bâtiment (11) s'étendant à partir dudit fond de gouttière (8) et une paroi intérieure côté extérieur opposée (10) s'étendant à partir dudit fond de gouttière (8), et ladite gouttière (1) comprenant un bord de gouttière côté bâtiment (9) et un bord de gouttière extérieur opposé (9).

3. La gouttière (1) selon l'une des revendications précédentes, comprenant en outre un ensemble de couplage de gouttière pour coupler deux gouttières (1) à leurs extrémités afin de fournir une gouttière continue.

4. L'ensemble de gouttière (1) de la revendication 3, dans lequel l'ensemble de couplage de gouttière comprend :

- une première pièce d'accouplement de gouttière (20A) comprenant une extrémité de fixation de gouttière (43) pour attacher ladite extrémité de l'une des deux gouttières (1), et une première bride de fermeture (41), et
- une deuxième pièce de couplage de gouttière (20B) comprenant une extrémité de fixation de gouttière (43) pour attacher ladite extrémité a l'autre desdites deux gouttières (1), et une bride d'étanchéité de couplage de gouttière (42) complémentaire à ladite première bride de fermeture (41) afin de fournir un couplage étanche à l'eau. pour assurer l'étanchéité.

5. L'ensemble de gouttière (1) de la revendication 4, dans lequel :

- ladite première pièce de couplage de gouttière (20A) comprenant une extrémité de fixation de gouttière (43) pour la fixation à ladite extrémité de l'une des deux gouttières (1), et une première bride de couplage (41), et
- ladite deuxième pièce de couplage de gouttière (20B) comprenant une extrémité de fixation de gouttière (43) pour la fixation à ladite extrémité de l'autre desdites deux gouttières (1), et une bride d'étanchéité de couplage de gouttière (42) façonnée pour permettre, en fonctionnement, à ladite première bride de couplage (41) de glisser sur ladite bride d'étanchéité de couplage de gouttière (42).

6. L'assemblage de gouttière (1) de la revendication précédente, dans lequel ladite extrémité de fixation de gouttière de ladite première et ladite seconde partie de couplage de gouttière (20A, 20B) comprennent chacune une plaque de couplage (40) correspondant sensiblement à une section transversale de ladite gouttière (1), pour l'attacher, en particulier la fixer, à une extrémité de gouttière, par exemple la fixer en utilisant de l'adhésif.

7. L'ensemble de gouttière (1) de l'une des revendications 4 à 6, dans lequel ladite extrémité de fixation de gouttière (43) comprend en outre une bride de fixation de couplage de gouttière (43) comprenant une surface extérieure correspondant à une surface intérieure de la gouttière (1) pour permettre le couplage, dans un mode de réalisation la fixation, la bride de fixation de couplage de gouttière (43) et ladite surface intérieure de la gouttière (1).

8. L'ensemble de gouttière (1) de l'une des revendications 4 à 7, dans lequel ladite bride de couplage (41) a un côté gouttière, et ladite seconde bride d'étanchéité (42) a une surface d'étanchéité dont la surface d'étanchéité et le côté gouttière sont en affleurement avec une surface intérieure de la bride de fixation de gouttière (43).

9. L'ensemble de gouttière selon l'une quelconque des revendications précédentes, comprenant en outre un capteur d'eau (100) pour fournir un signal d'alerte en cas de colmatage de la gouttière.

10. L'ensemble de gouttière de la revendication 9, dans lequel ledit capteur d'eau (100) comprend un élément de détection (103) pour détecter un niveau d'eau dans ladite gouttière, dans un mode de réalisation s'étendant dans ladite gouttière (1) jusqu'à une hauteur prédéfinie au-dessus d'une paroi intérieure inférieure de la gouttière (2) pour détecter l'eau

au-dessus d'un niveau prédéfini de hauteur d'eau (wh) dans ladite gouttière (1), ledit capteur d'eau (100) comprend en outre :

- une pièce de fixation pour attacher, en particulier par encliquetage, ledit capteur d'eau sur sur ladite gouttière (1) ;
- une alimentation électrique, en particulier un élément photovoltaïque (101), pour fournir une énergie électrique opérationnelle audit capteur d'eau ;
- un émetteur sans fil pour transmettre un signal lorsqu'un niveau d'eau est détecté.

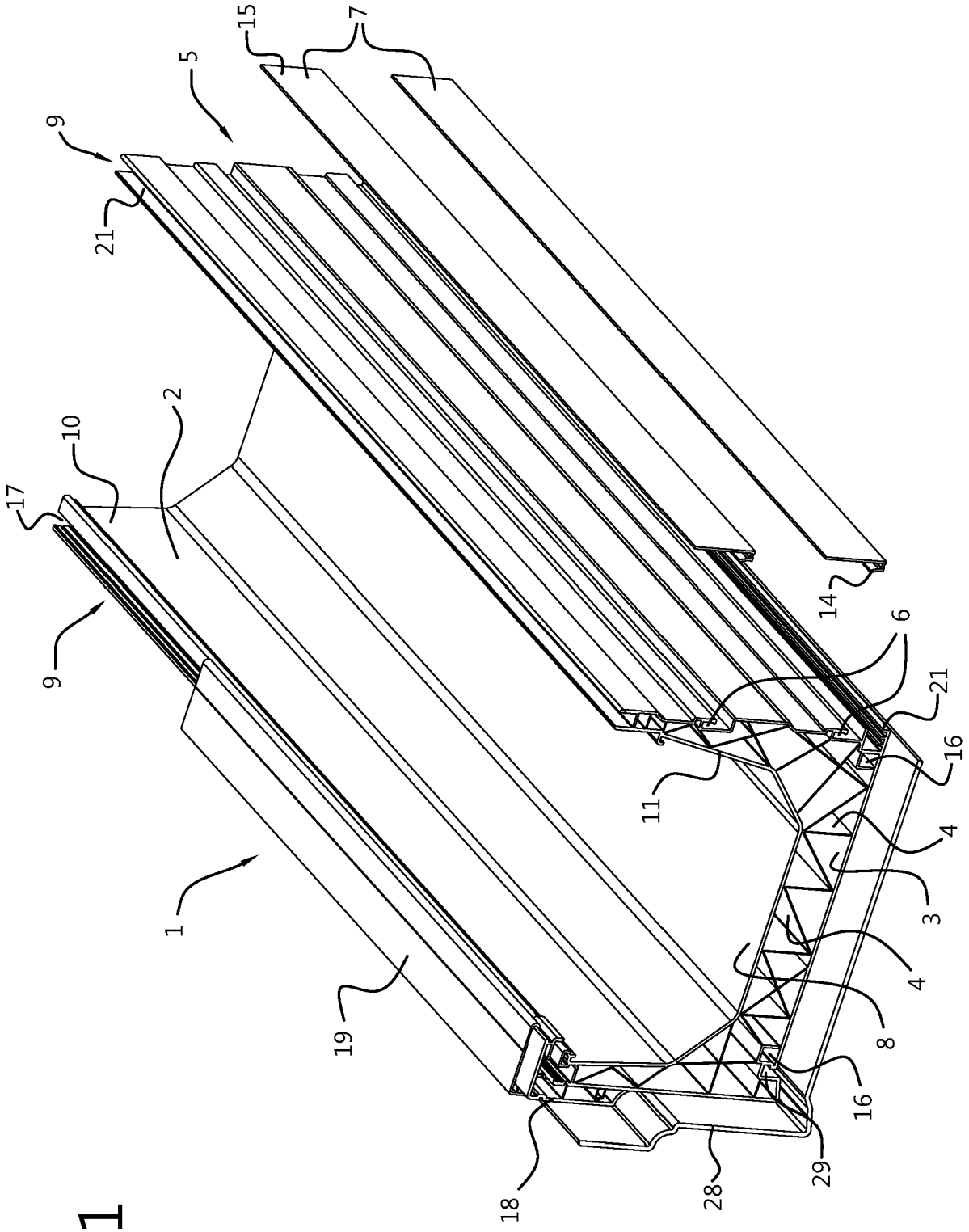

Fig. 1

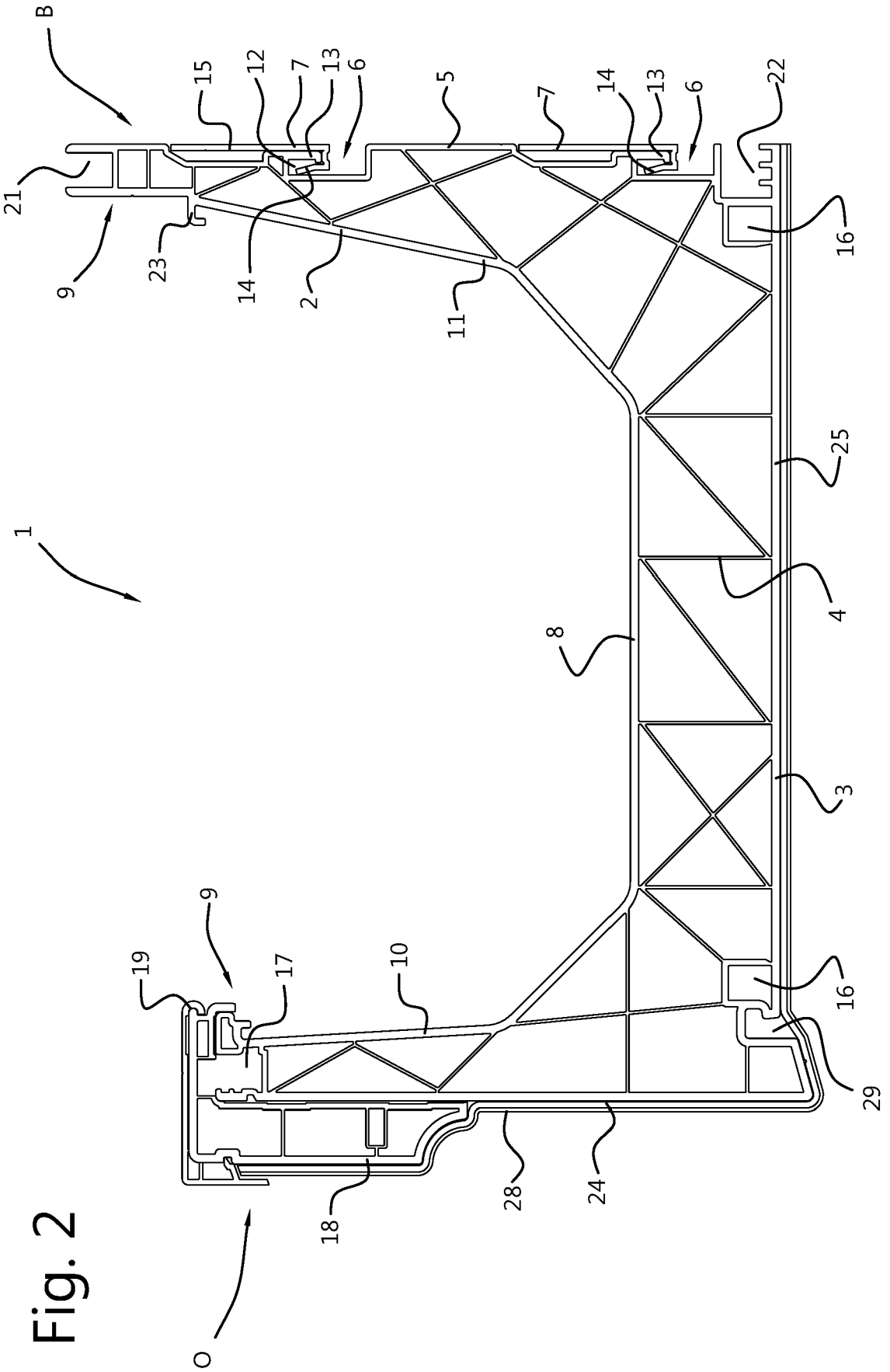
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Fig. 2

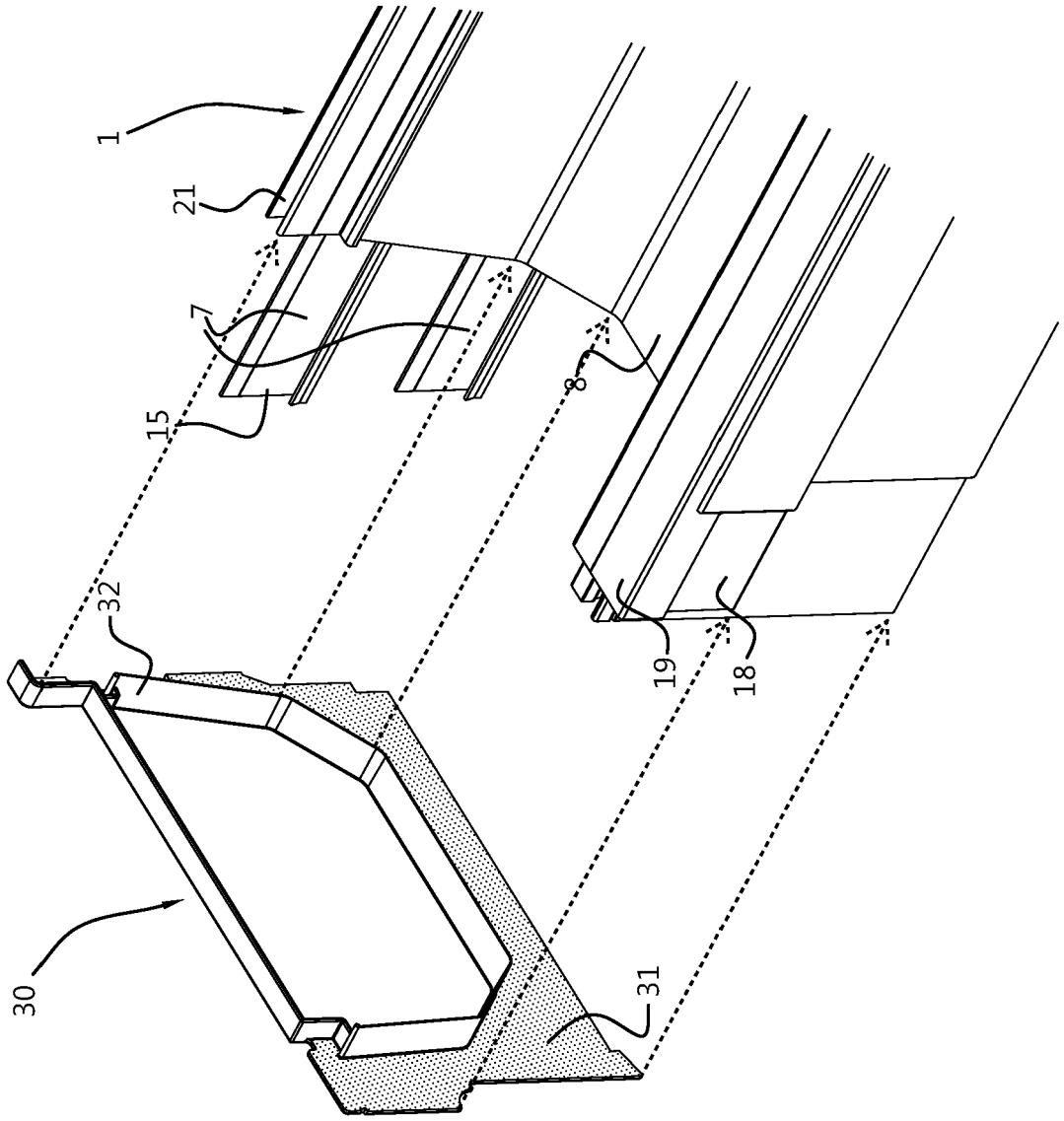


Fig. 3

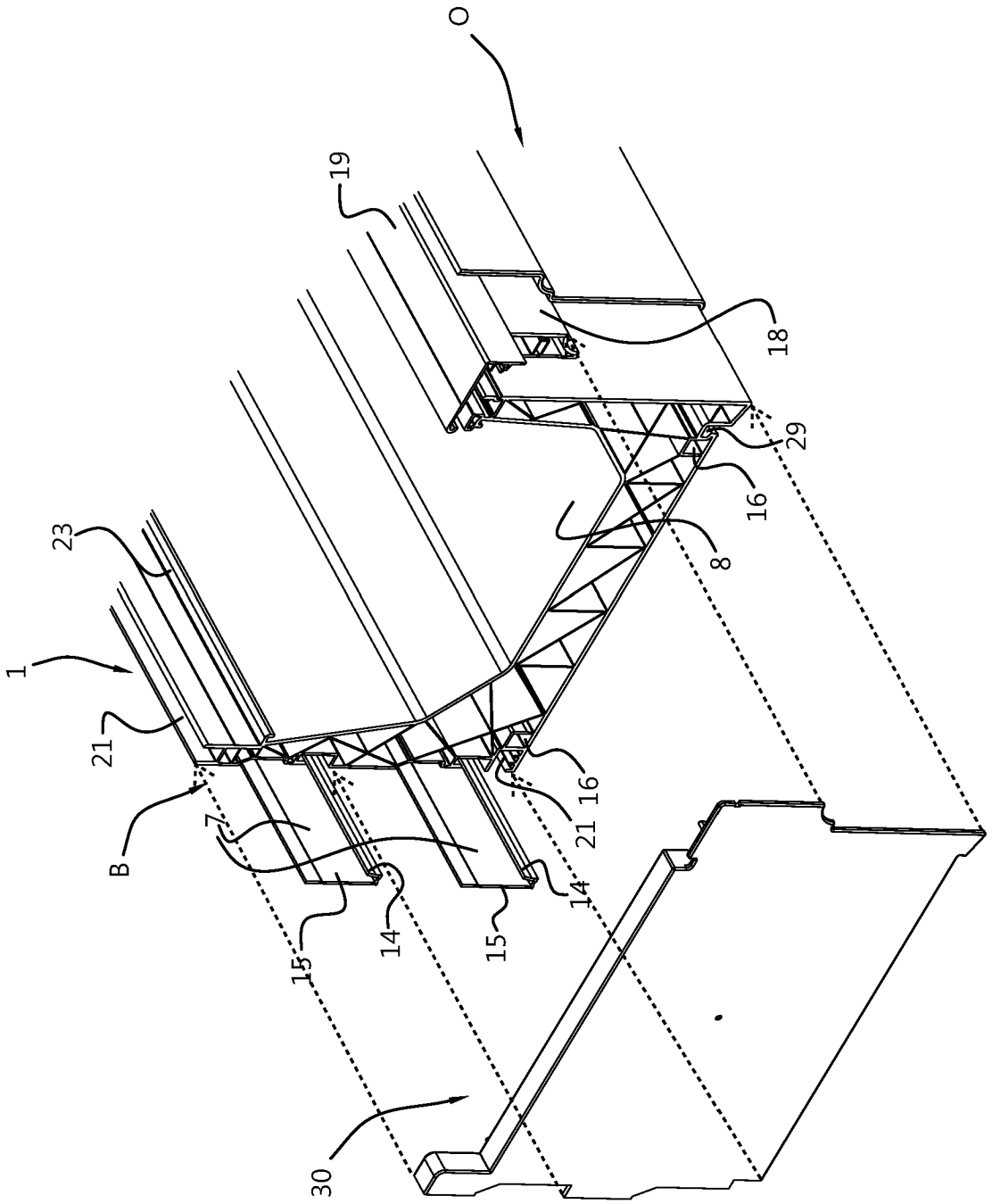


Fig. 4

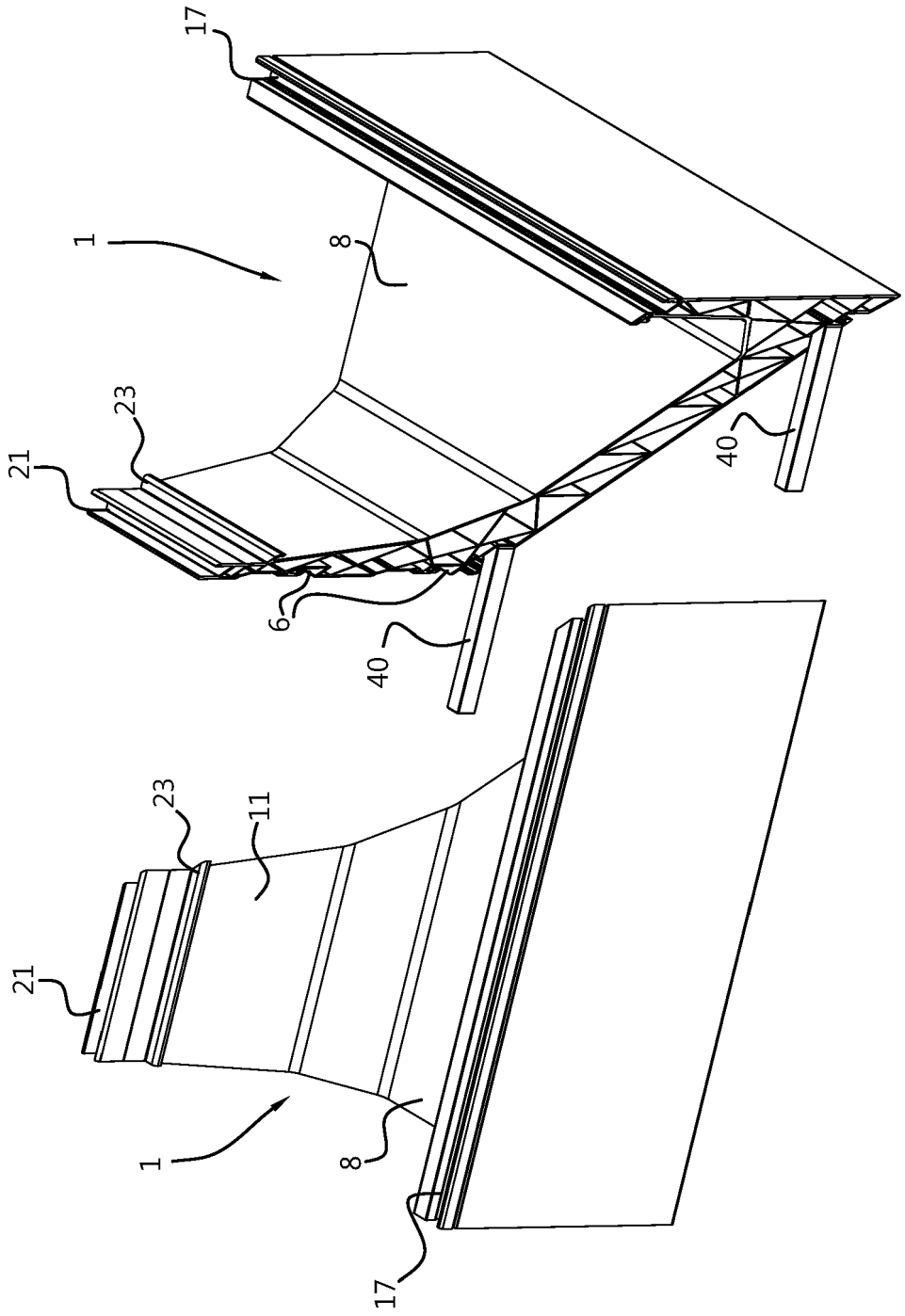


Fig. 5

Fig. 6

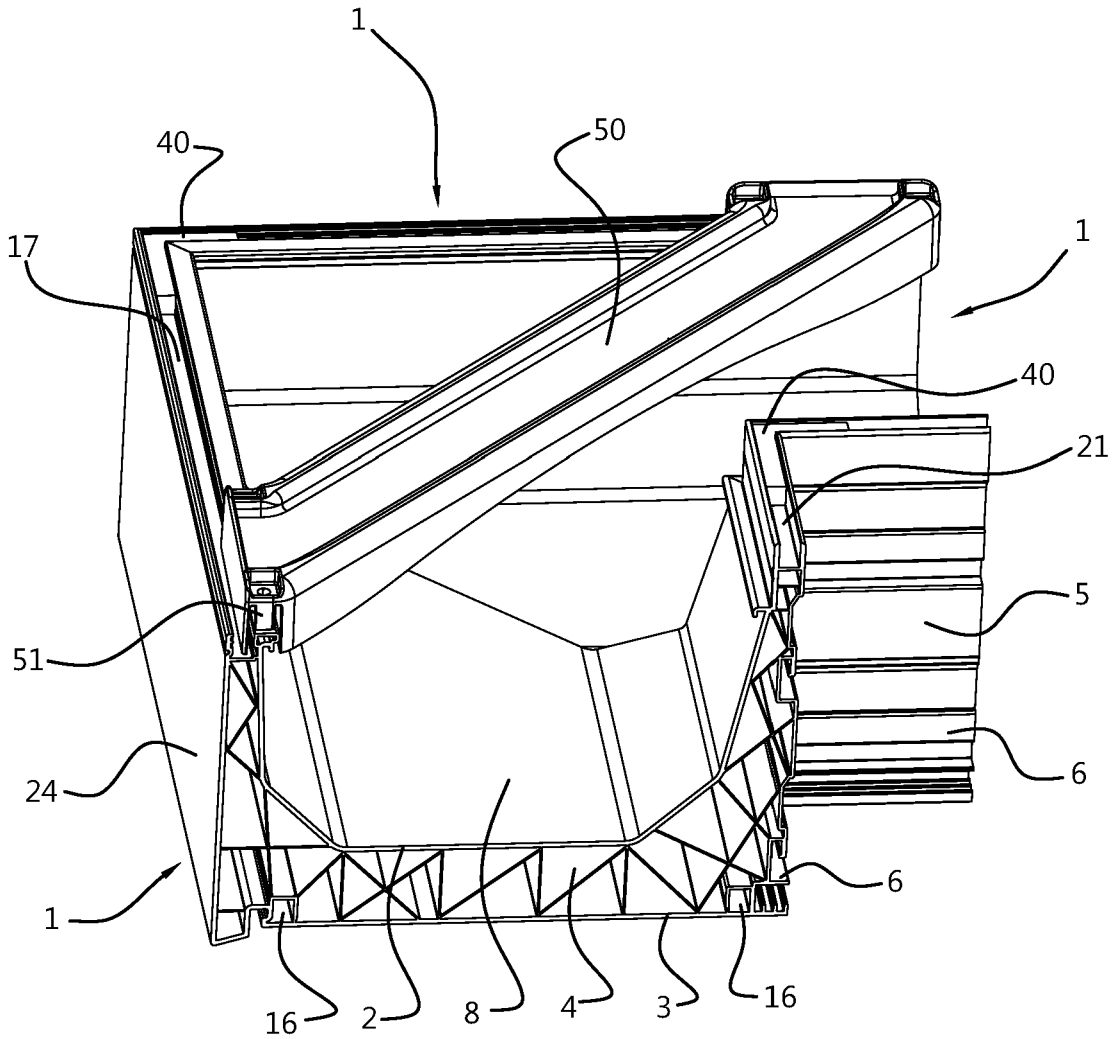


Fig. 7

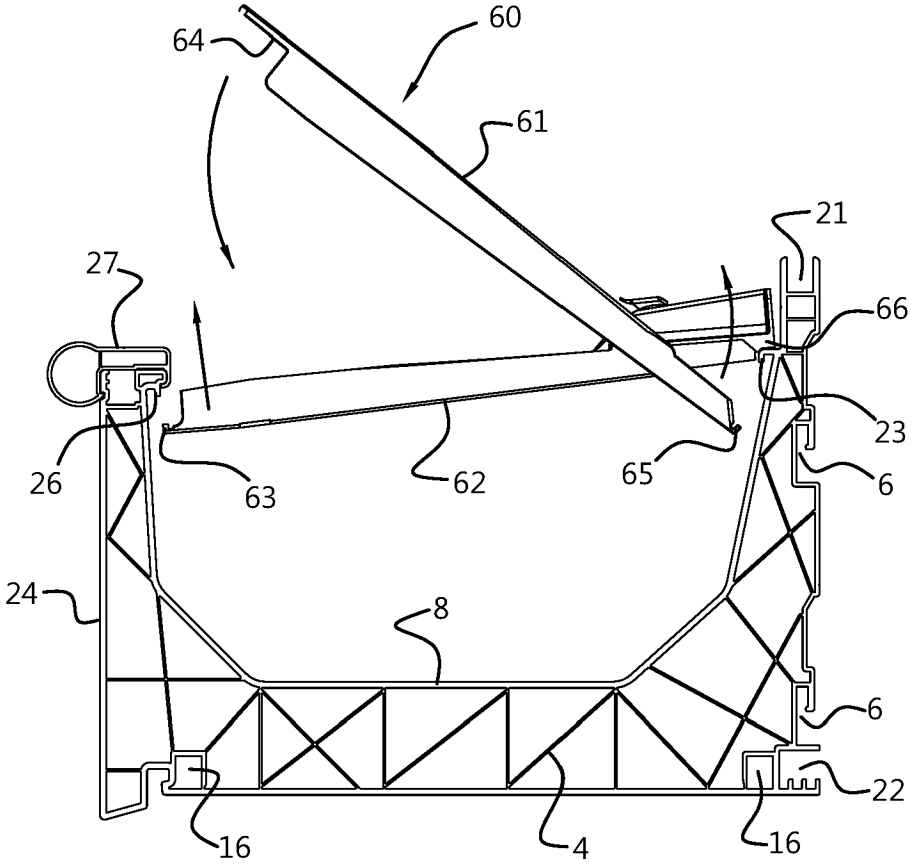


Fig. 8

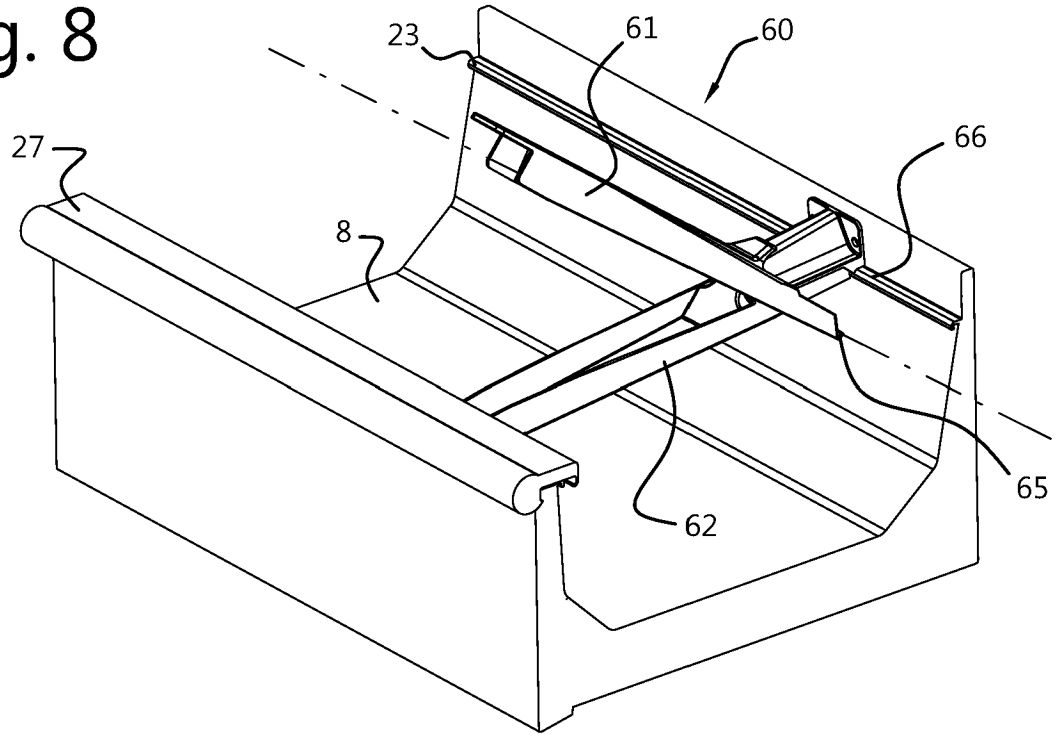


Fig. 9

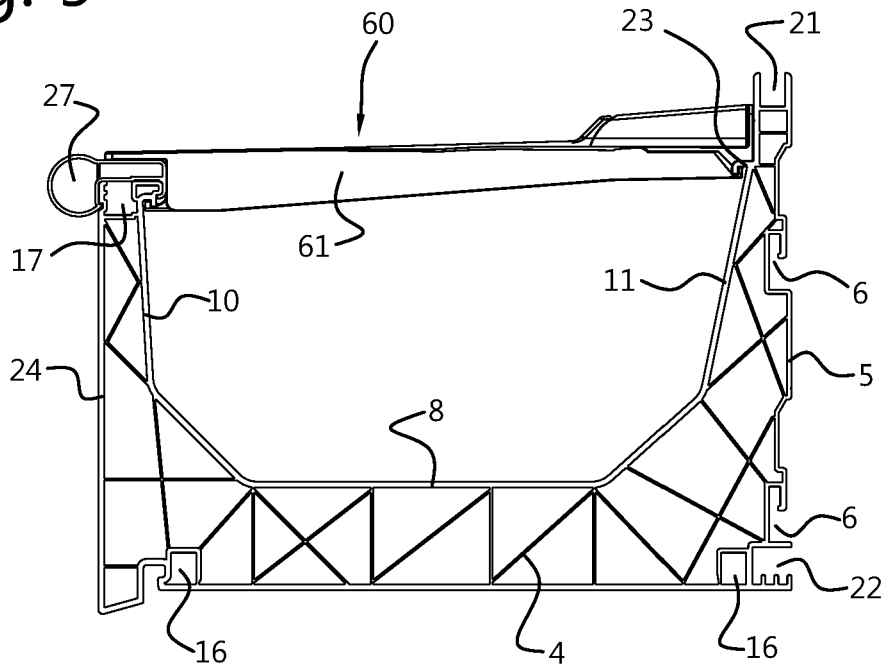
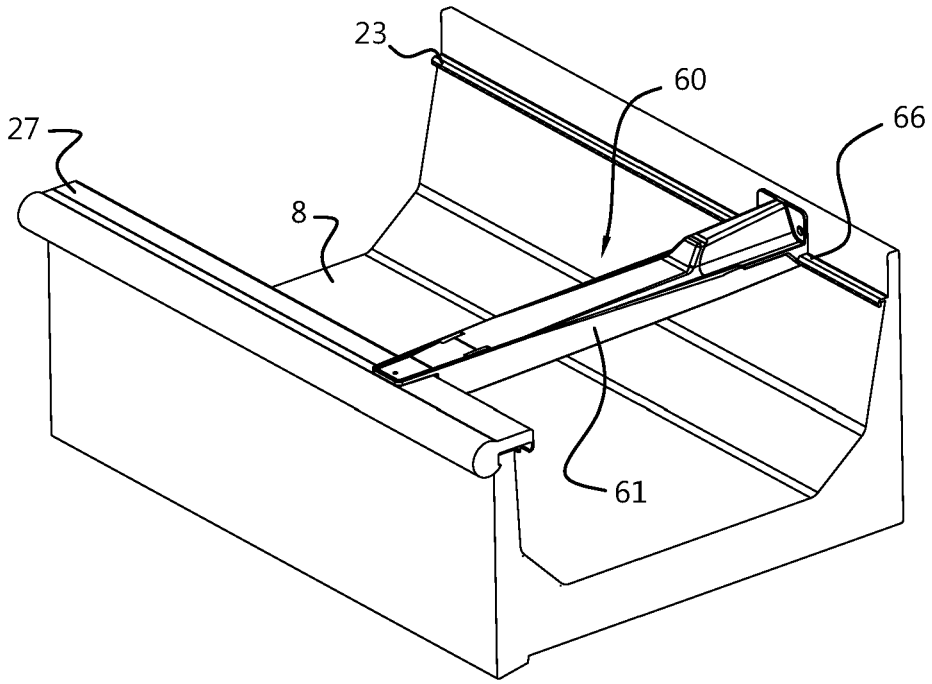


Fig. 10



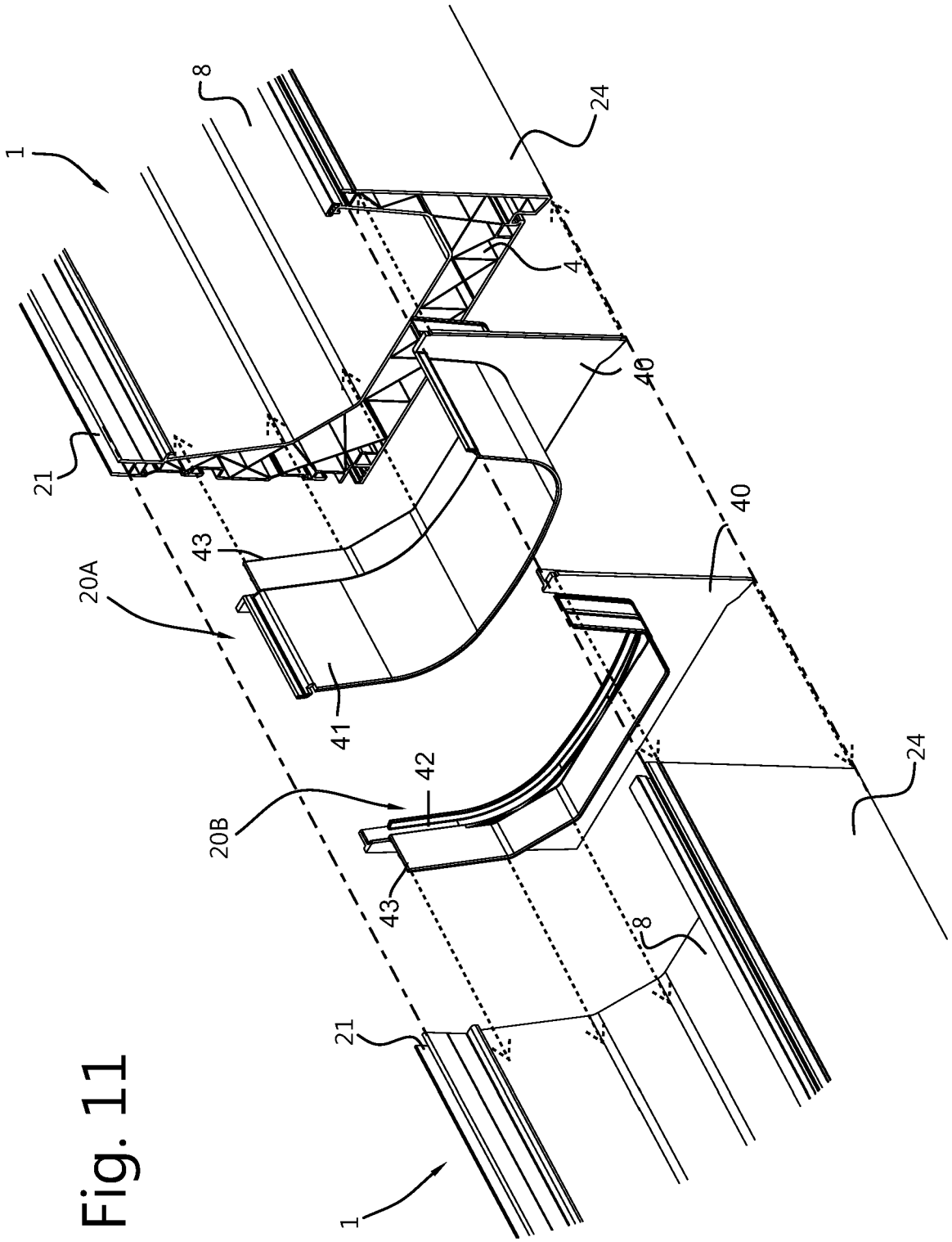
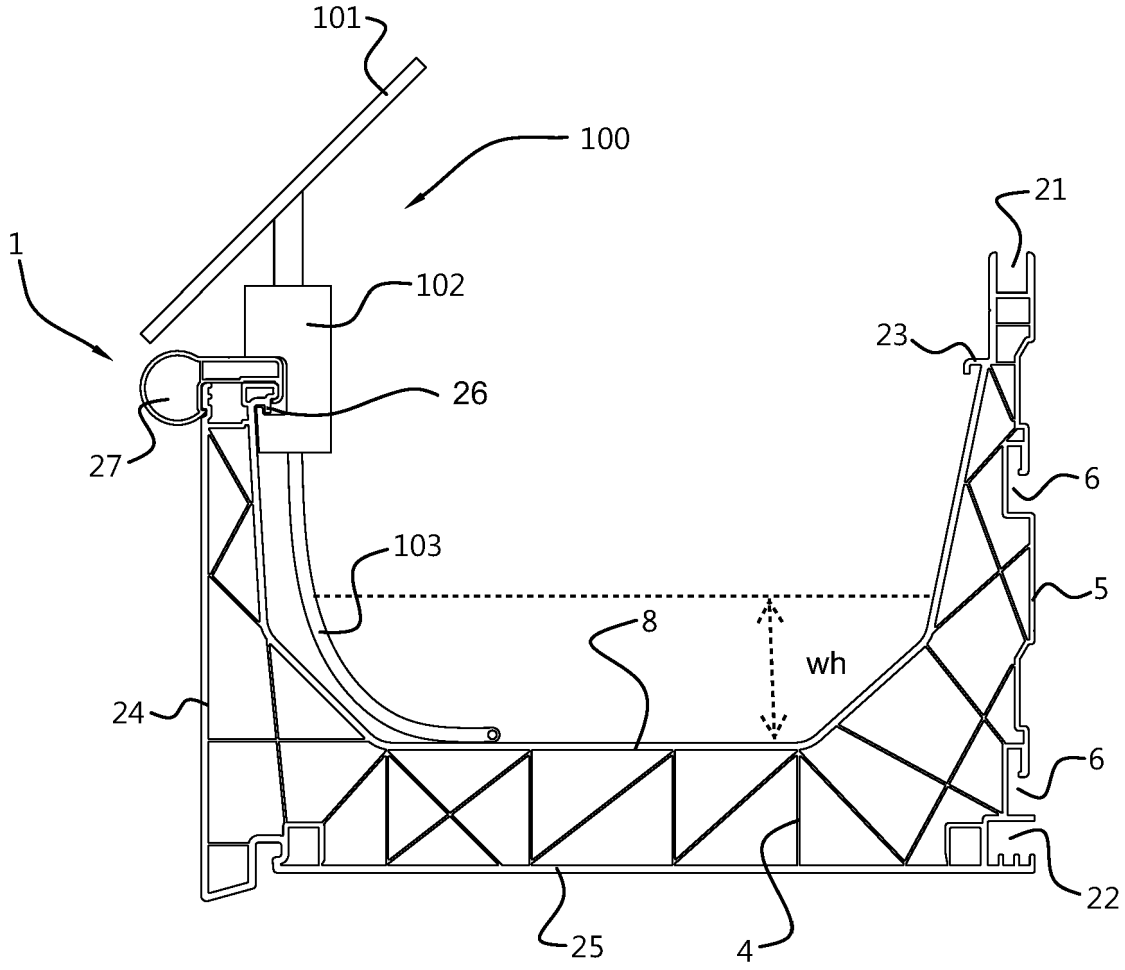


Fig. 11

Fig. 12



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 869230 A **[0002]**
- NL 194090 C **[0003]**
- NL 9202157 A **[0003]**
- EP 0971083 A2 **[0004]**
- WO 2004011738 A **[0005]**
- JP H0532549 U **[0006]**
- JP S638317 U **[0007]**
- DE 9207858 U **[0008]**
- US 4727689 A **[0010]**