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Neeb et al.

(10) **Patent No.: US 12,385,254 B2**
(45) **Date of Patent: Aug. 12, 2025**

(54) **EAVESTROUGH DEBRIS GUARD**

(71) Applicant: **5002193 ONTARIO INC.**, Guelph (CA)

(72) Inventors: **Timothy Howard Neeb**, Guelph (CA); **Tristan Zimmermann**, Guelph (CA); **Matthew Hadden**, Guelph (CA)

(73) Assignee: **1001234613 Ontario Inc.**, Guelph (CA)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **17/508,004**

(22) Filed: **Oct. 22, 2021**

(65) **Prior Publication Data**

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Related U.S. Application Data

(63) Continuation-in-part of application No. 16/829,682, filed on Mar. 25, 2020, now Pat. No. 12,129,654.

(60) Provisional application No. 63/104,119, filed on Oct. 22, 2020, provisional application No. 62/823,993, filed on Mar. 26, 2019.

(51) **Int. Cl.**
E04D 13/076 (2006.01)
E04D 13/068 (2006.01)

(52) **U.S. Cl.**
CPC ***E04D 13/076*** (2013.01); ***E04D 13/068*** (2013.01); *E04D 13/0762* (2013.01)

(58) **Field of Classification Search**
CPC . E04D 13/064; E04D 13/0643; E04D 13/068; E04D 13/076
USPC 52/11, 12
See application file for complete search history.

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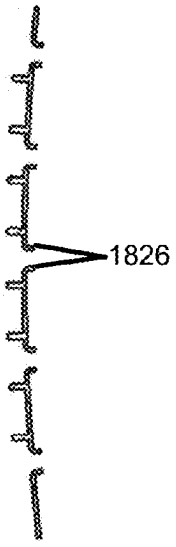
Primary Examiner — James J Buckle, Jr.
(74) *Attorney, Agent, or Firm* — Gowling WLG (Canada) LLP

(57) **ABSTRACT**

A debris guard for installation on an eavestrough is disclosed. The debris guard includes a frame having a back side, a front side, a length, two ends, a top surface, a bottom surface opposite the top surface, and a water collection portion extending from the front side to the back side and along the length of the frame between the two ends. The water collection portion includes a plurality of holes to allow rainwater to pass through. The water collection portion also includes a plurality of drip legs coupled to the plurality of holes, the plurality of drip legs extending below the bottom surface to provide improved water flow through the eavestrough debris guard. Each of the plurality of holes includes at least one drip leg that provide improved flow through the debris guard.

17 Claims, 24 Drawing Sheets



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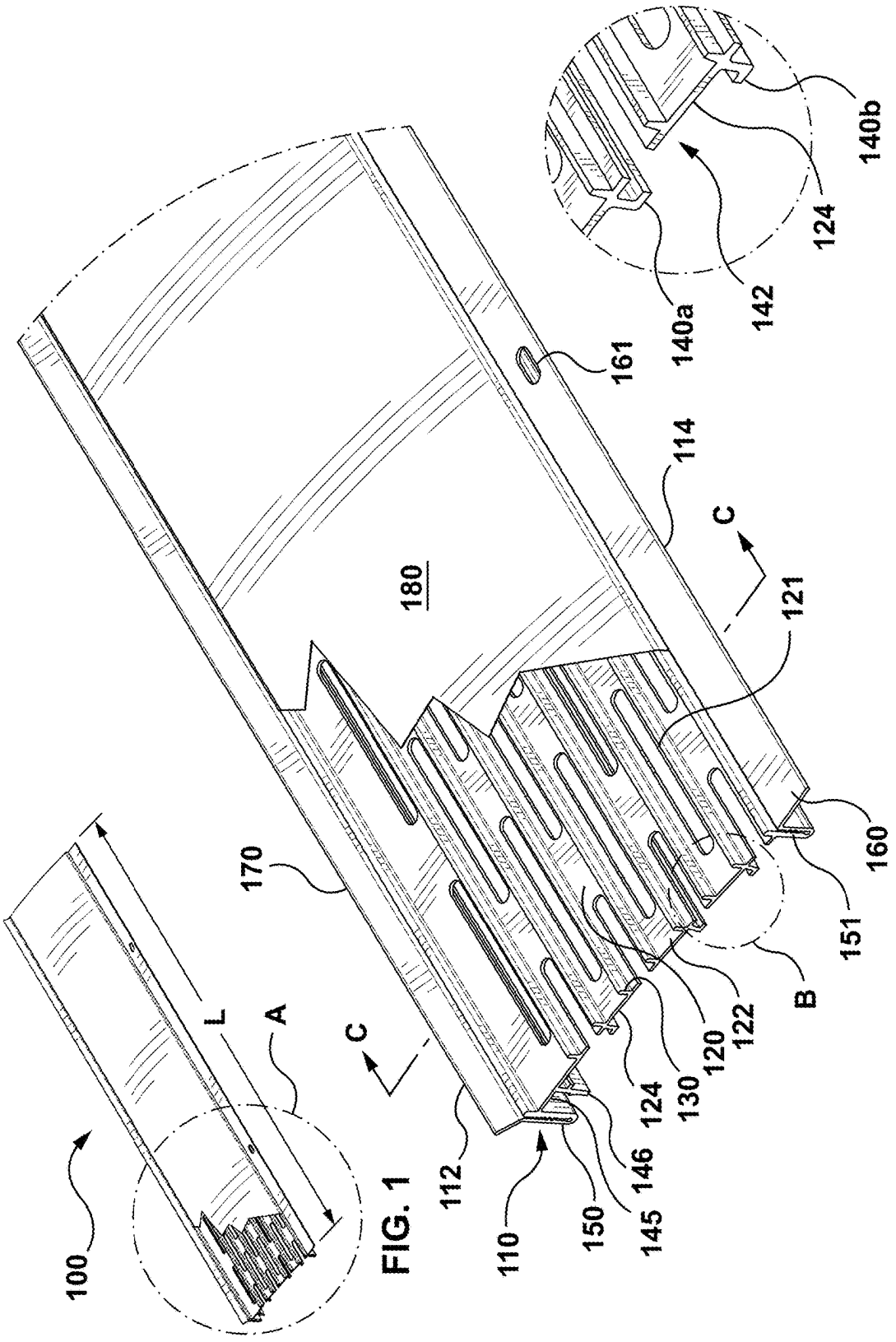

FIG. 1

FIG. 1A

FIG. 1B

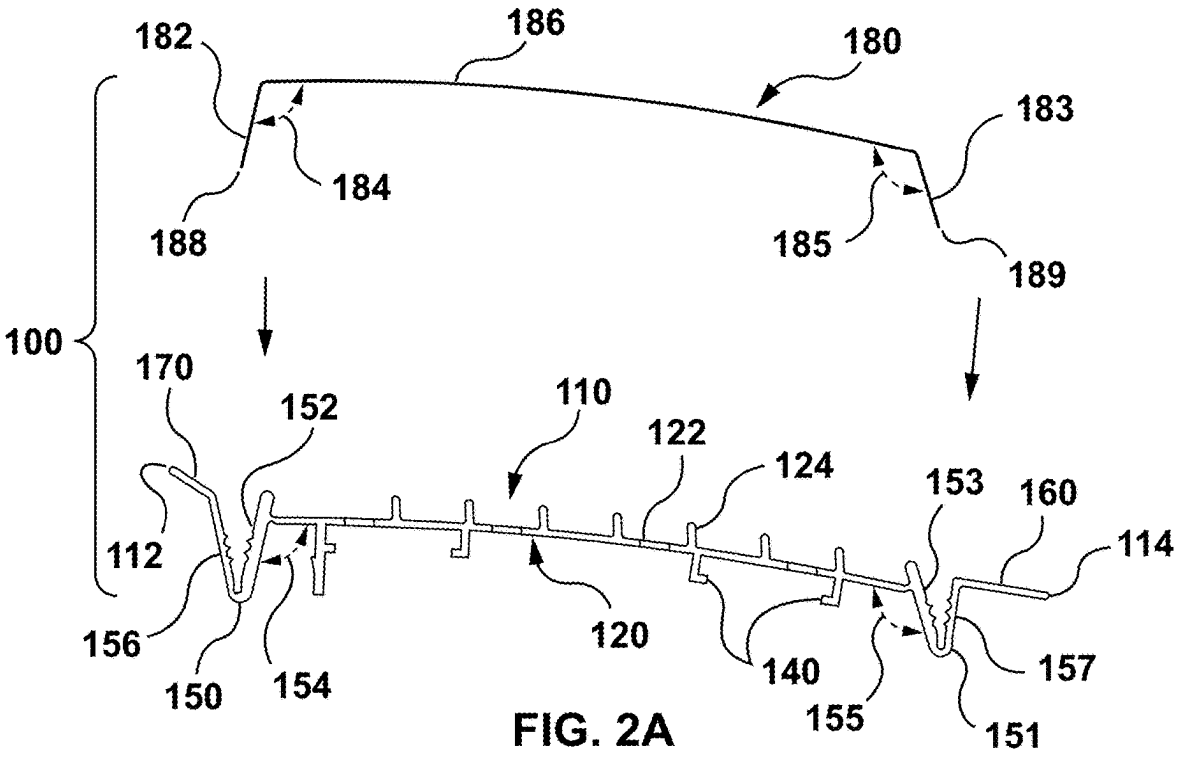

FIG. 2A

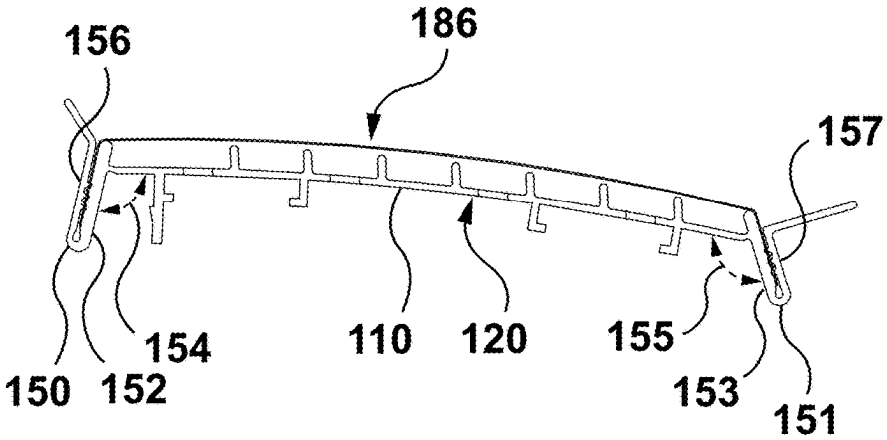

FIG. 2B

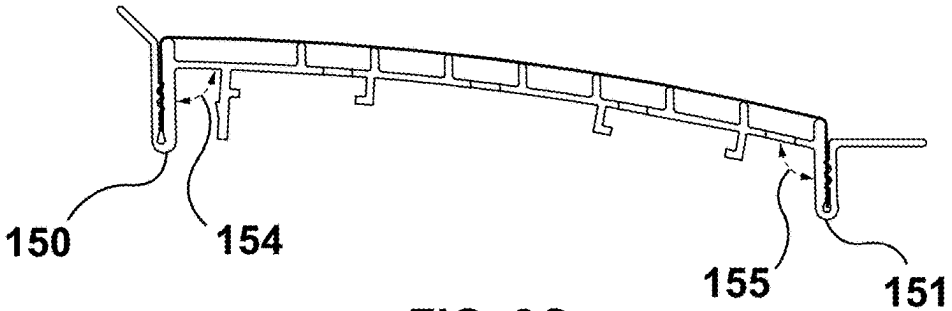

FIG. 2C

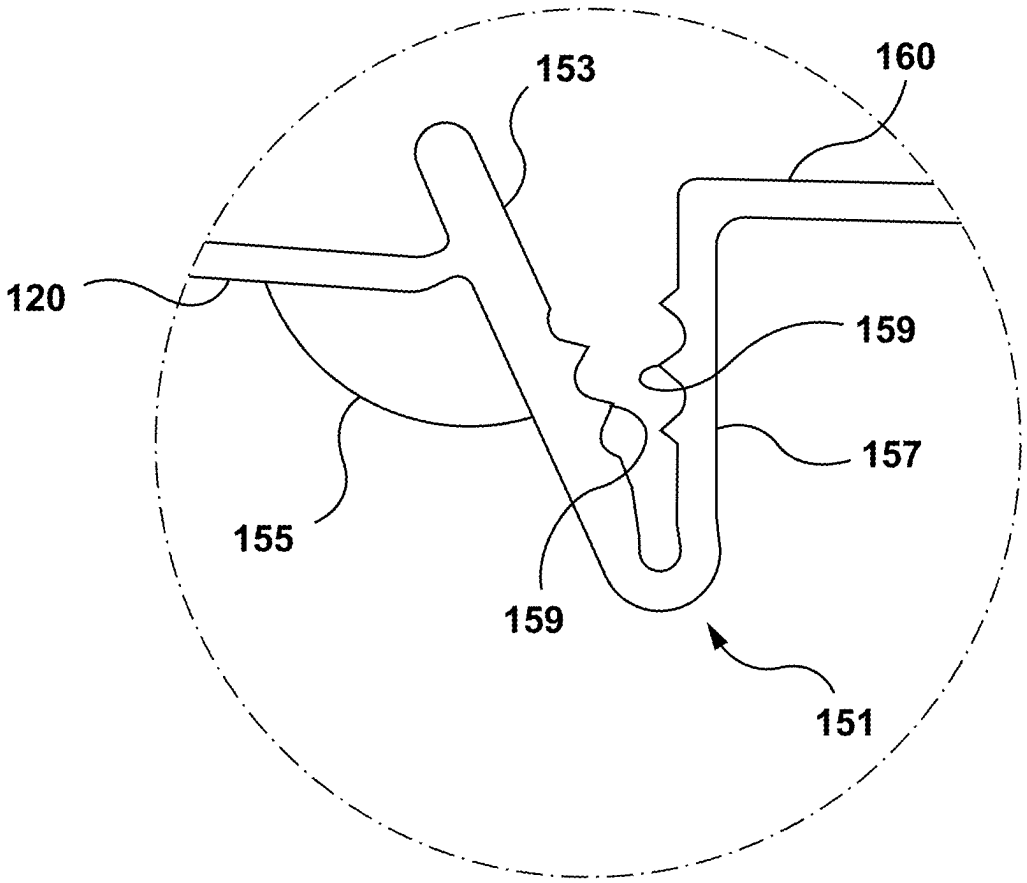

FIG. 3

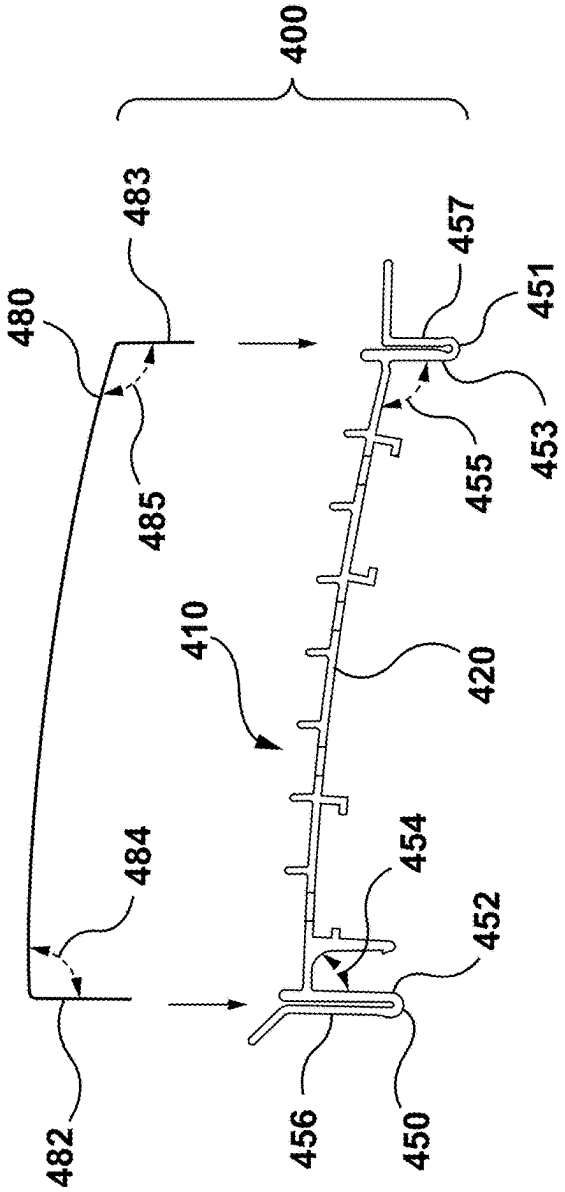

FIG. 4

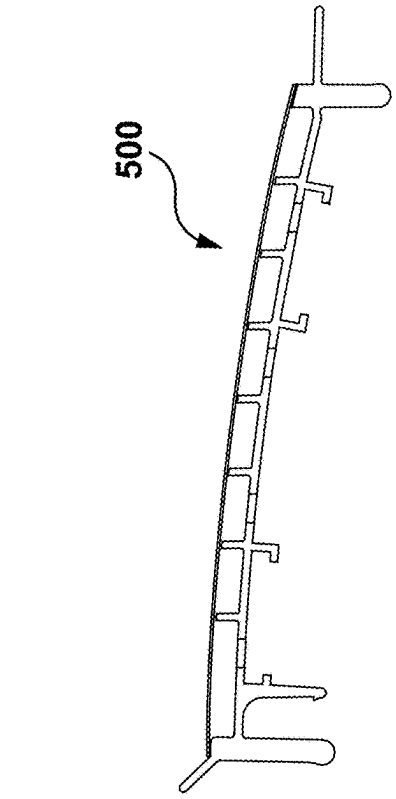

FIG. 5B

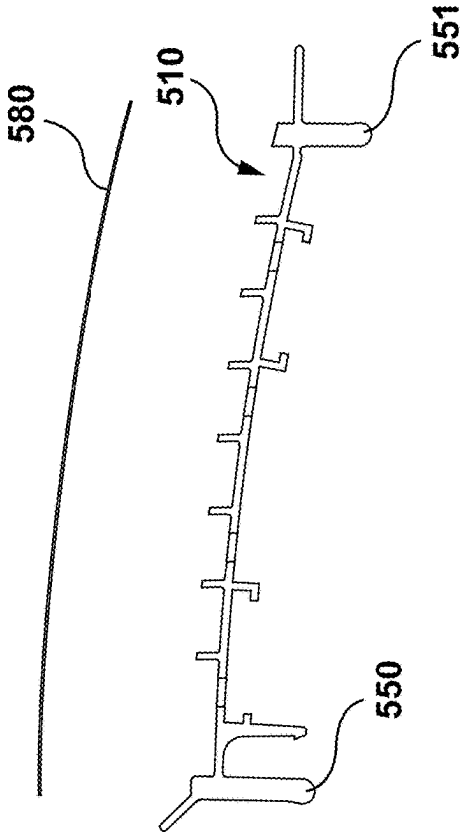

FIG. 5A

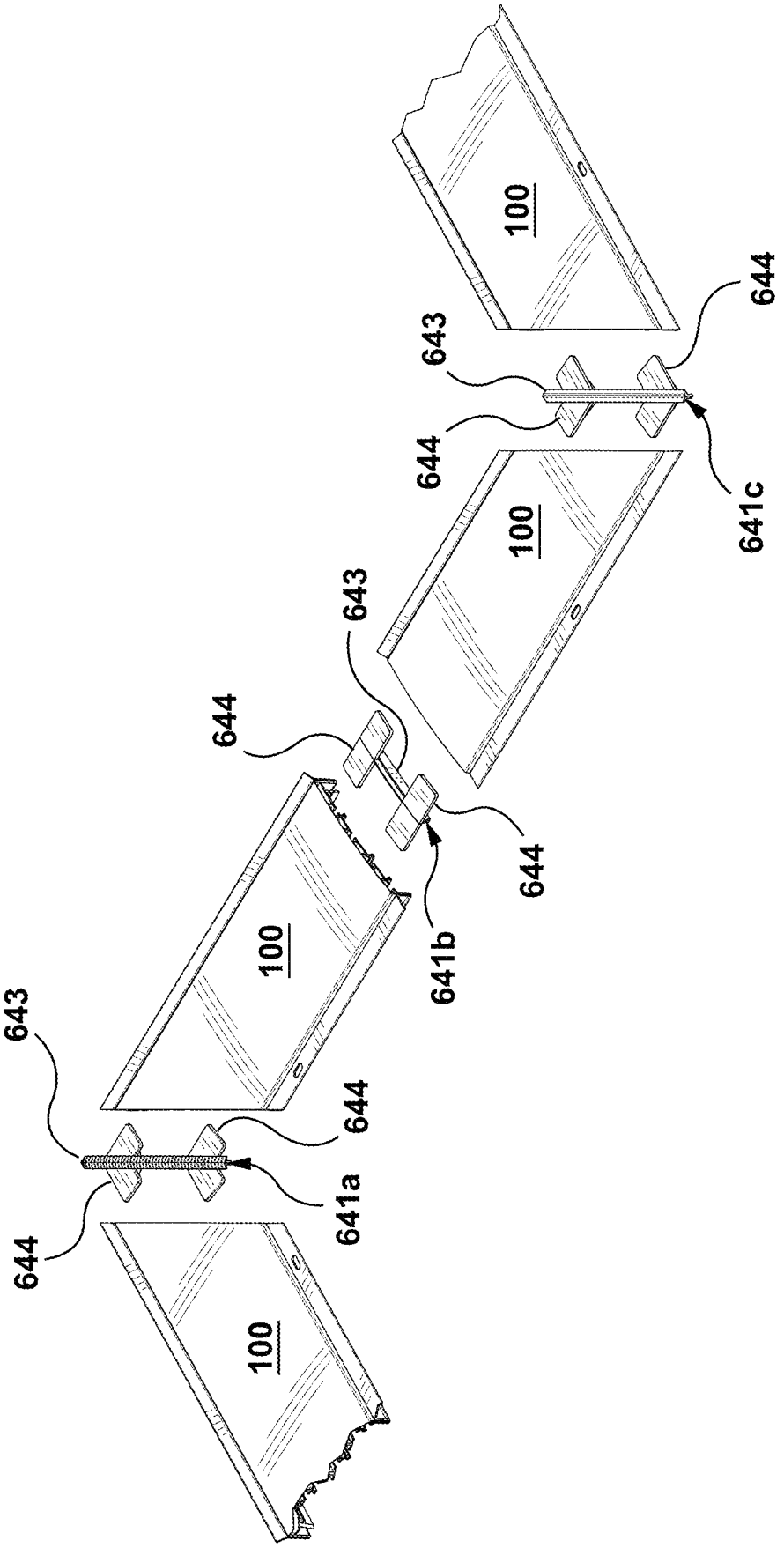
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FIG. 6

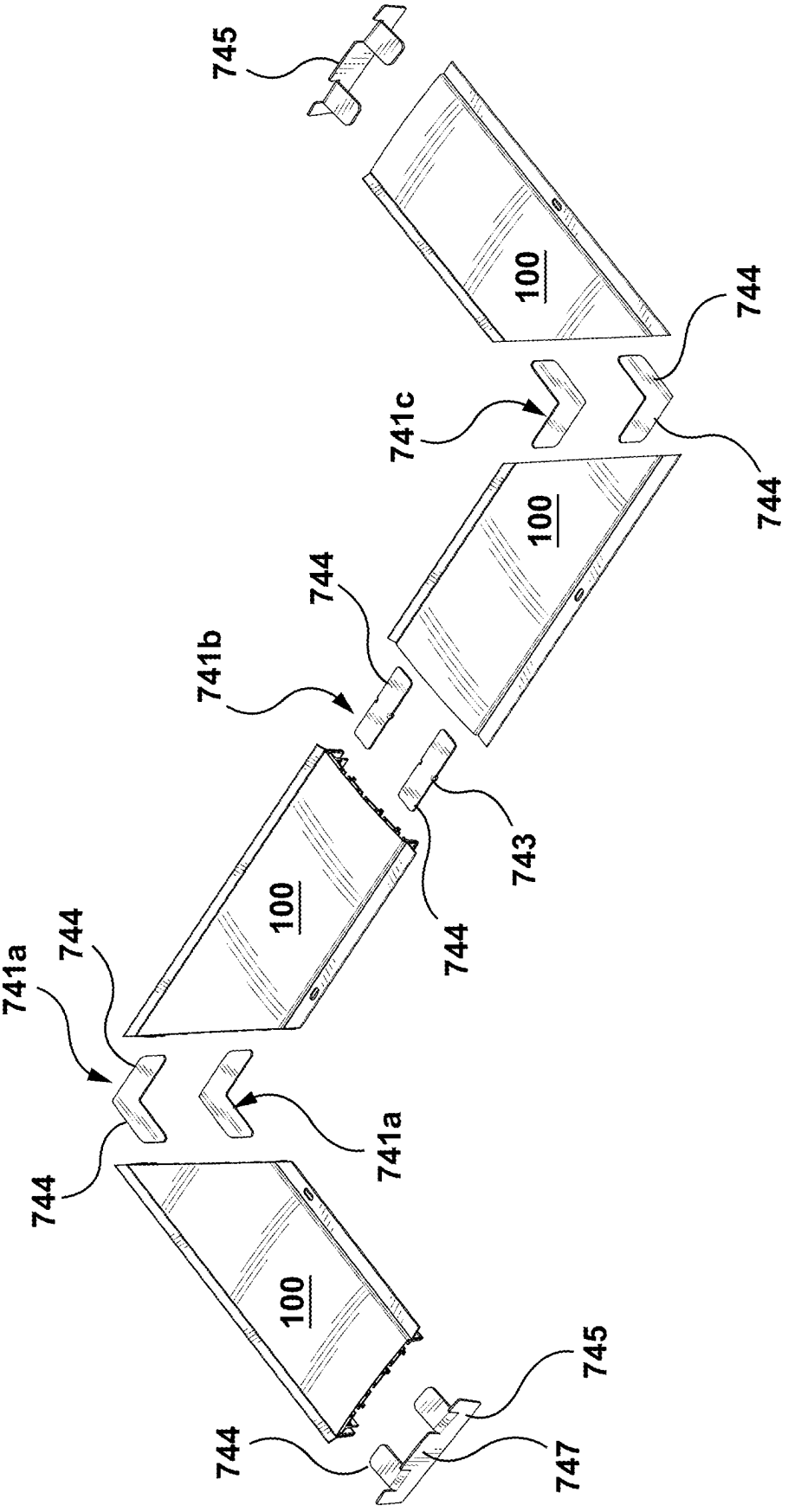
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FIG. 7

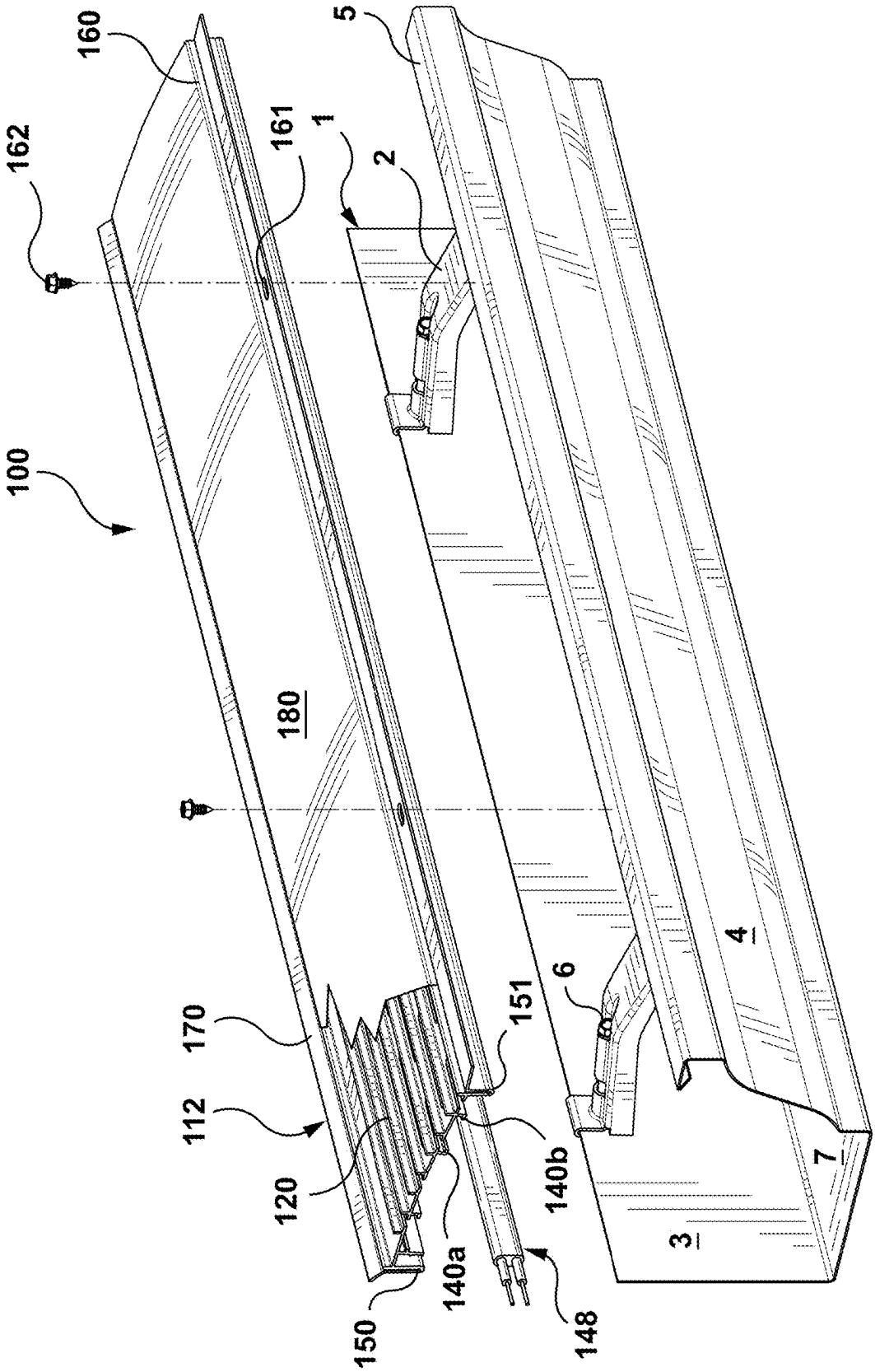

FIG. 8

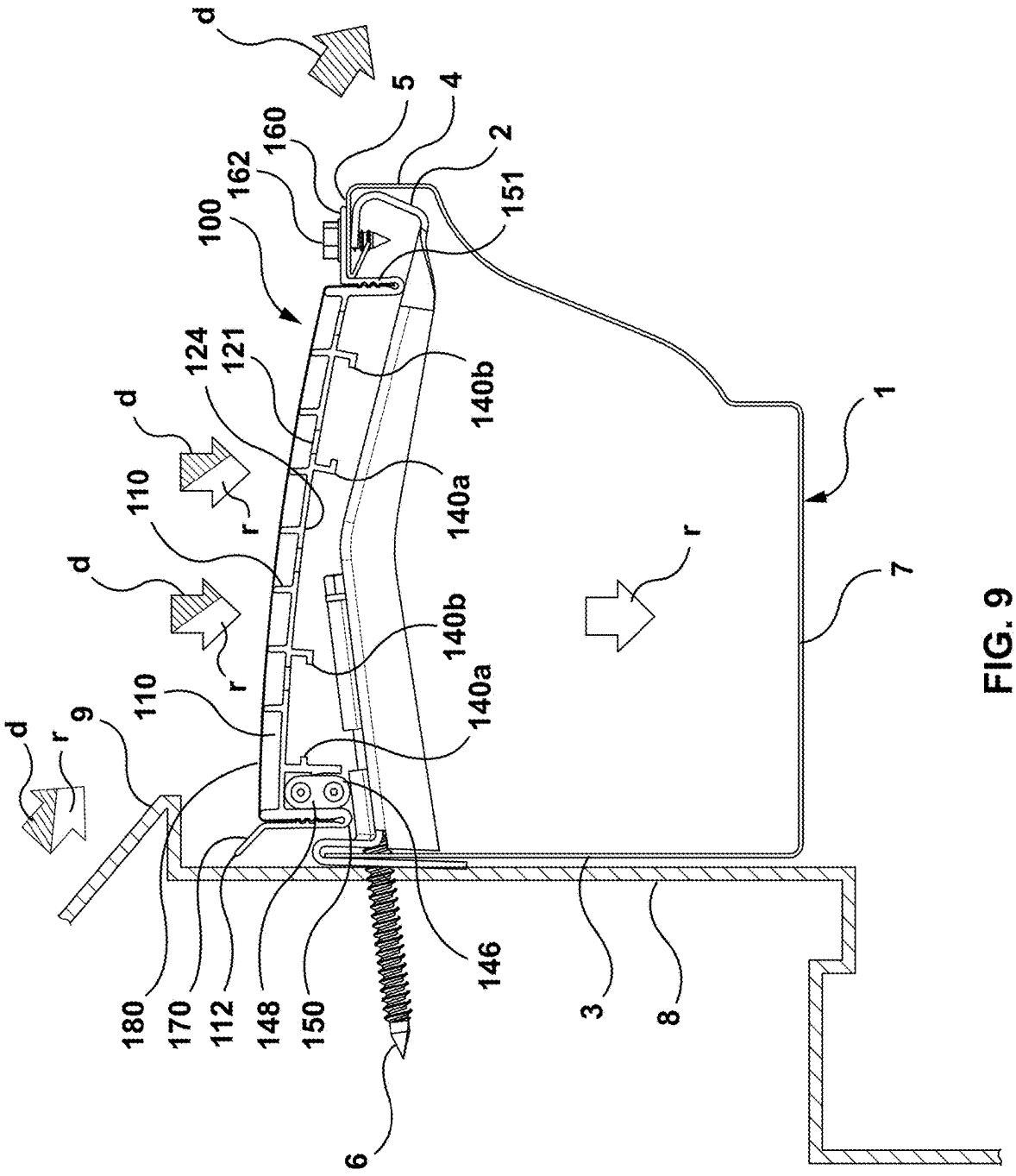
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FIG. 9

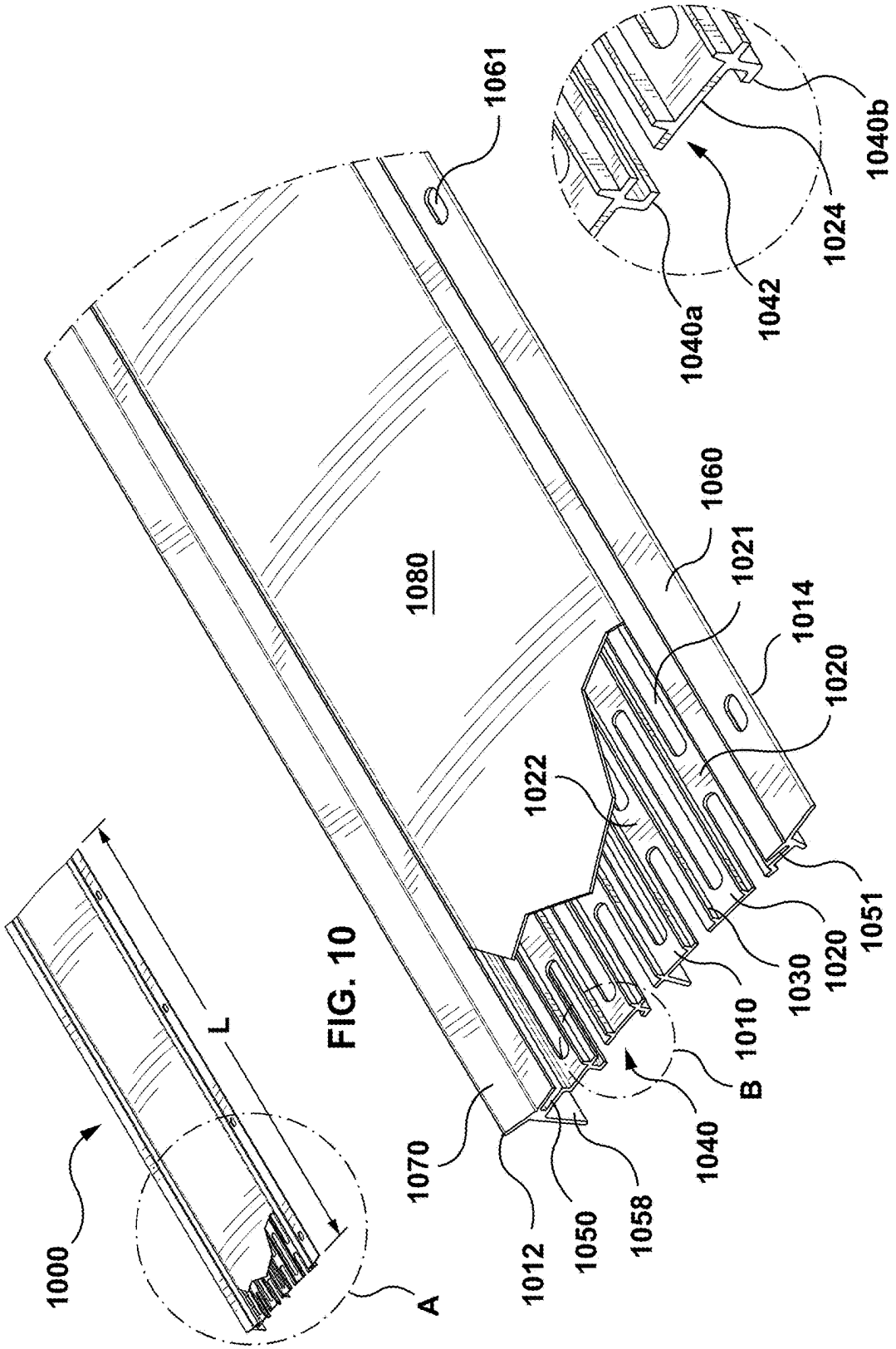

FIG. 10

FIG. 10A

FIG. 10B

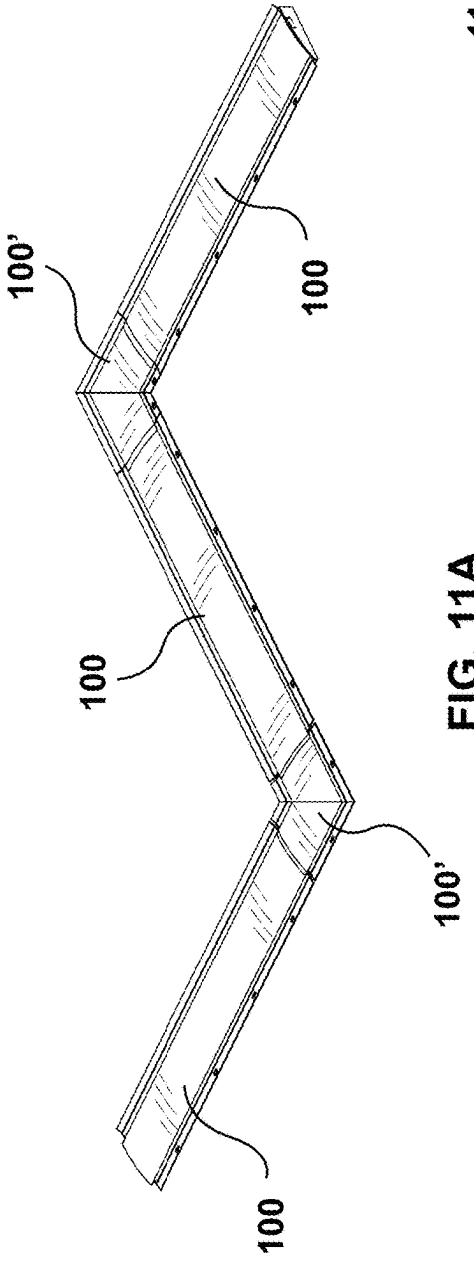

FIG. 11A

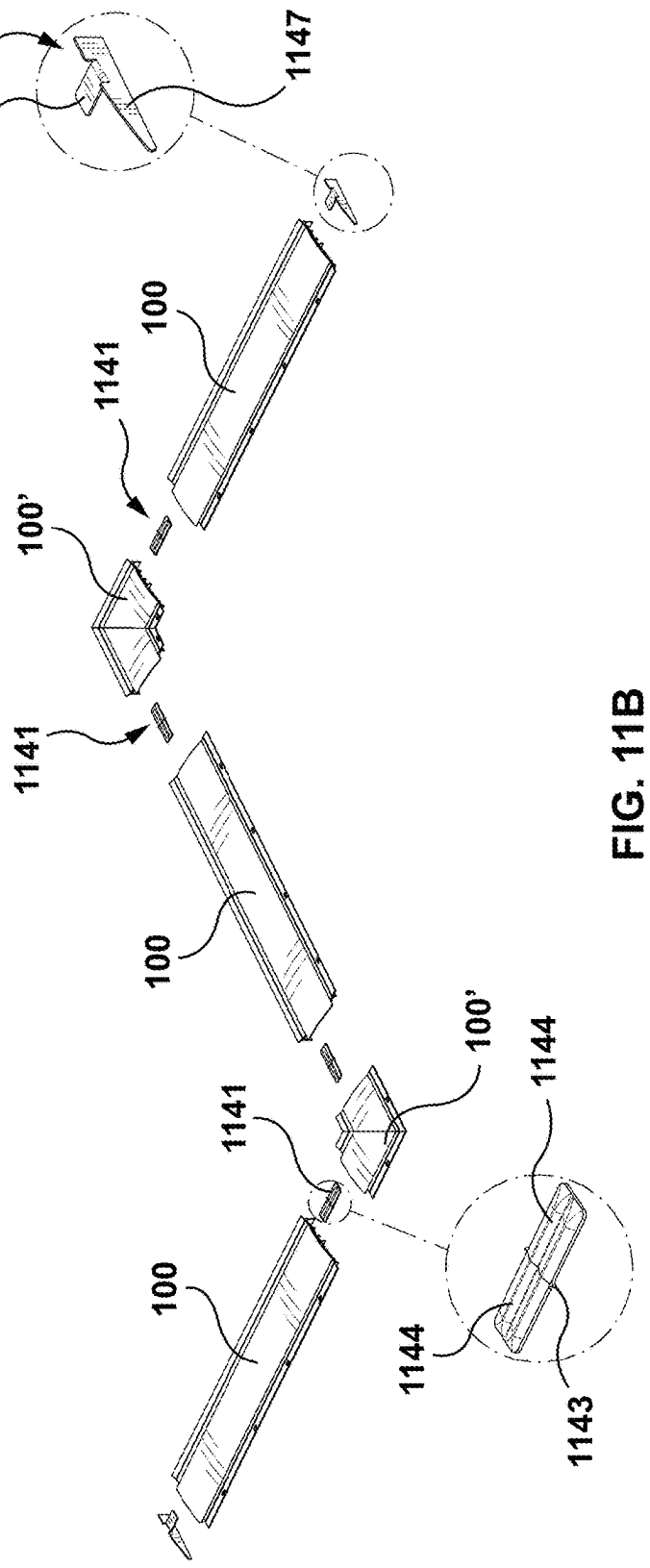

FIG. 11B

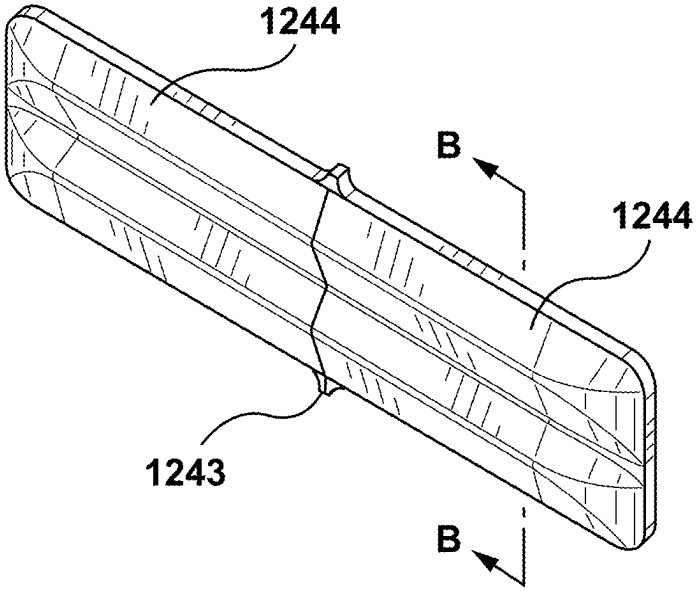

FIG. 12

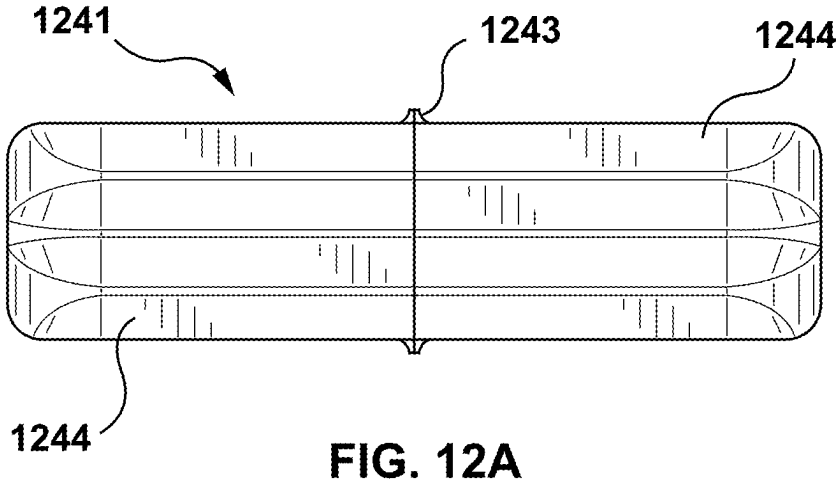

FIG. 12A

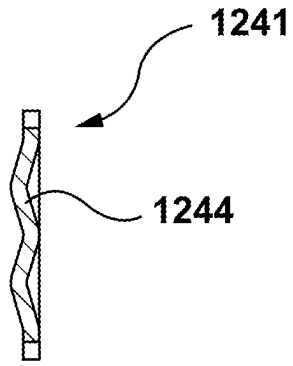

FIG. 12B

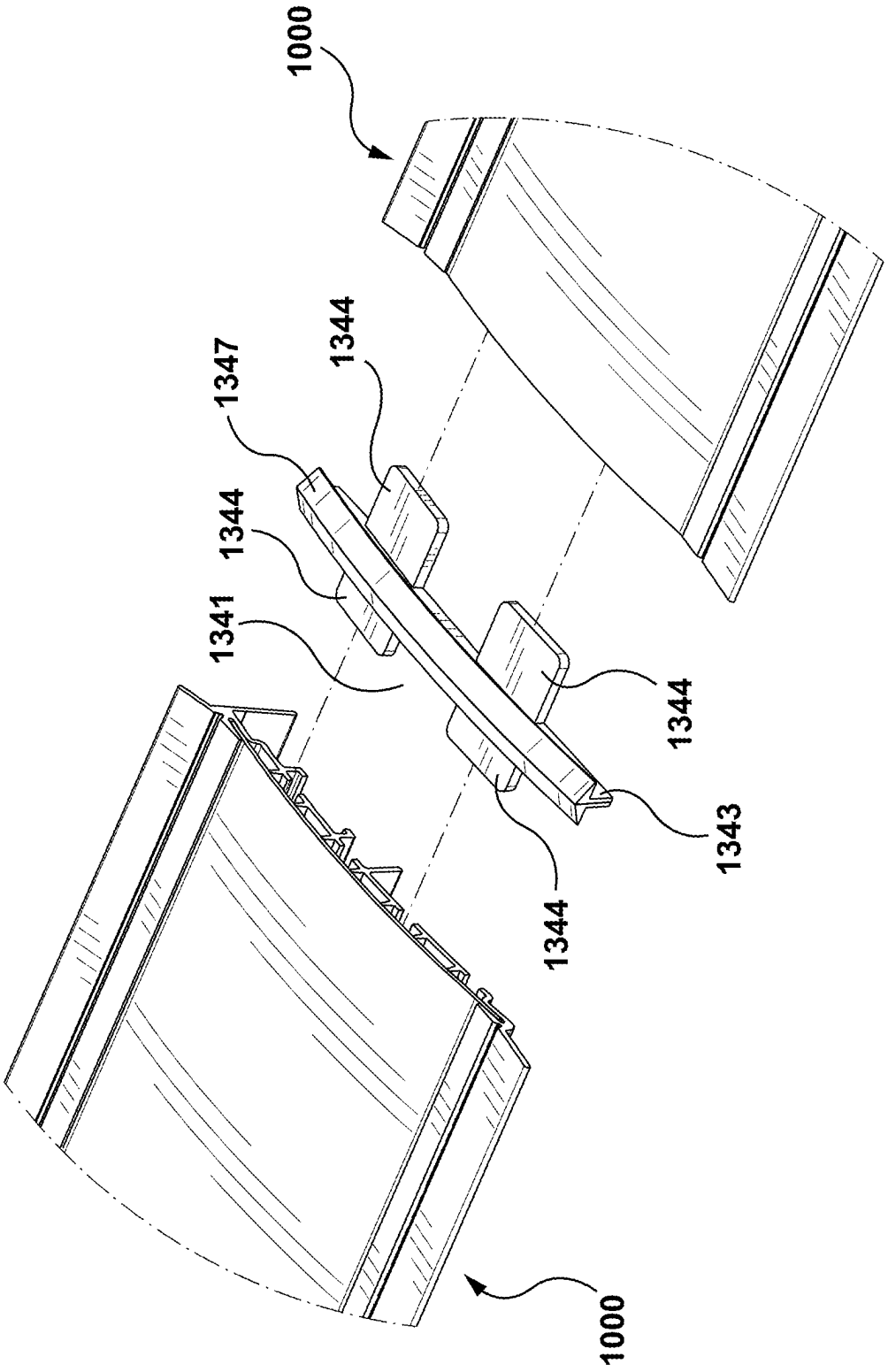

FIG. 13A

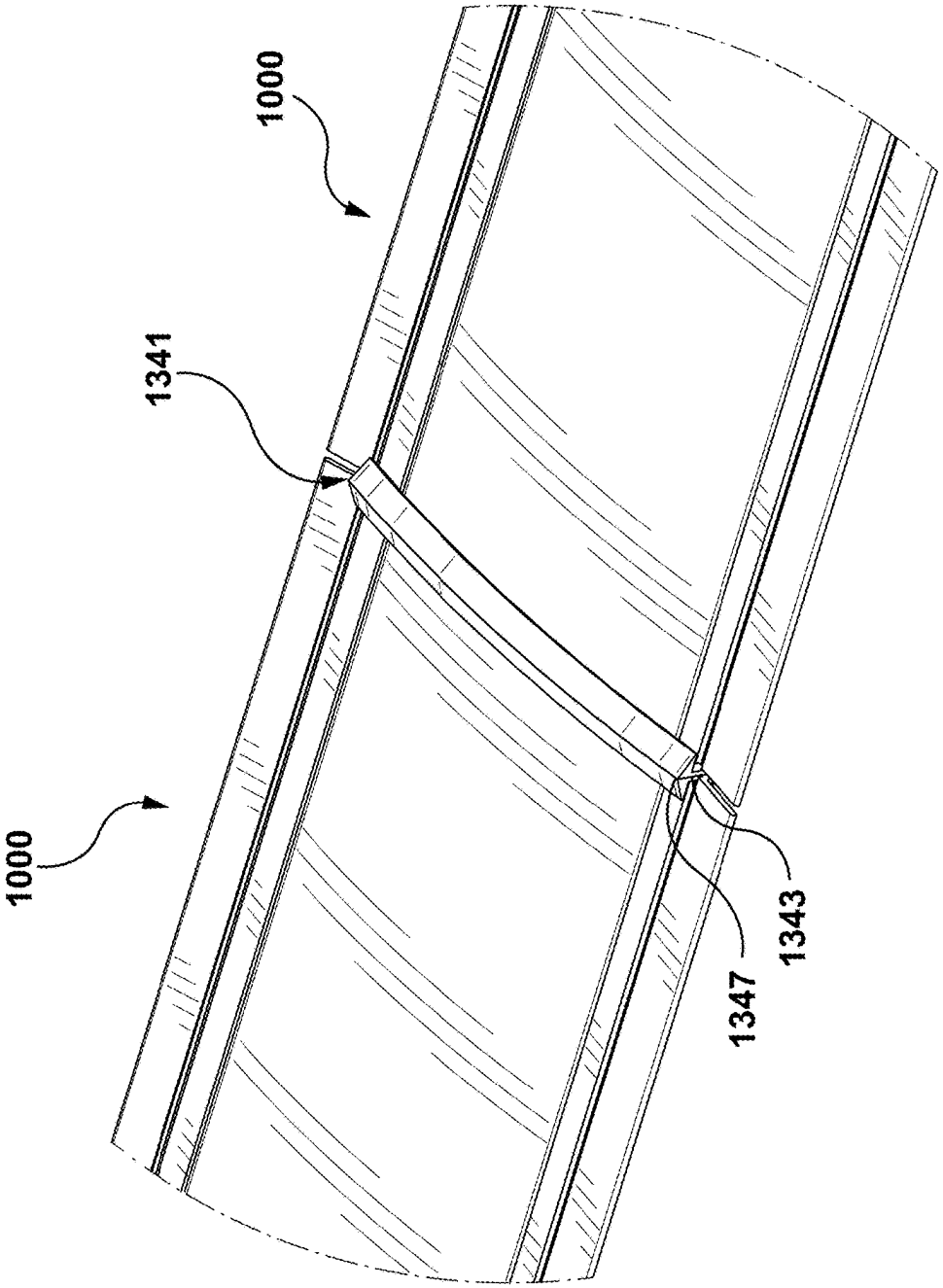

FIG. 13B

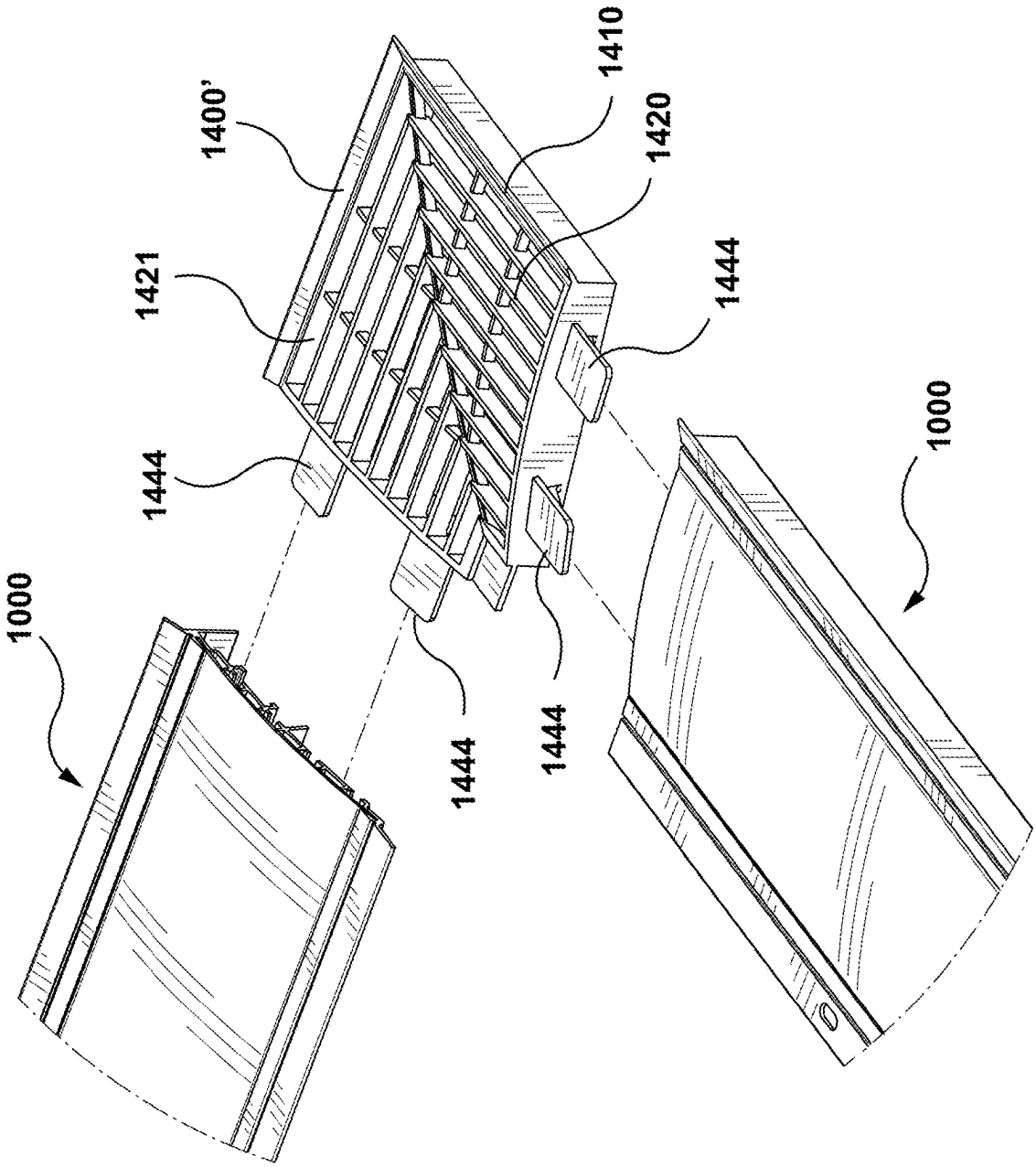

FIG. 14A

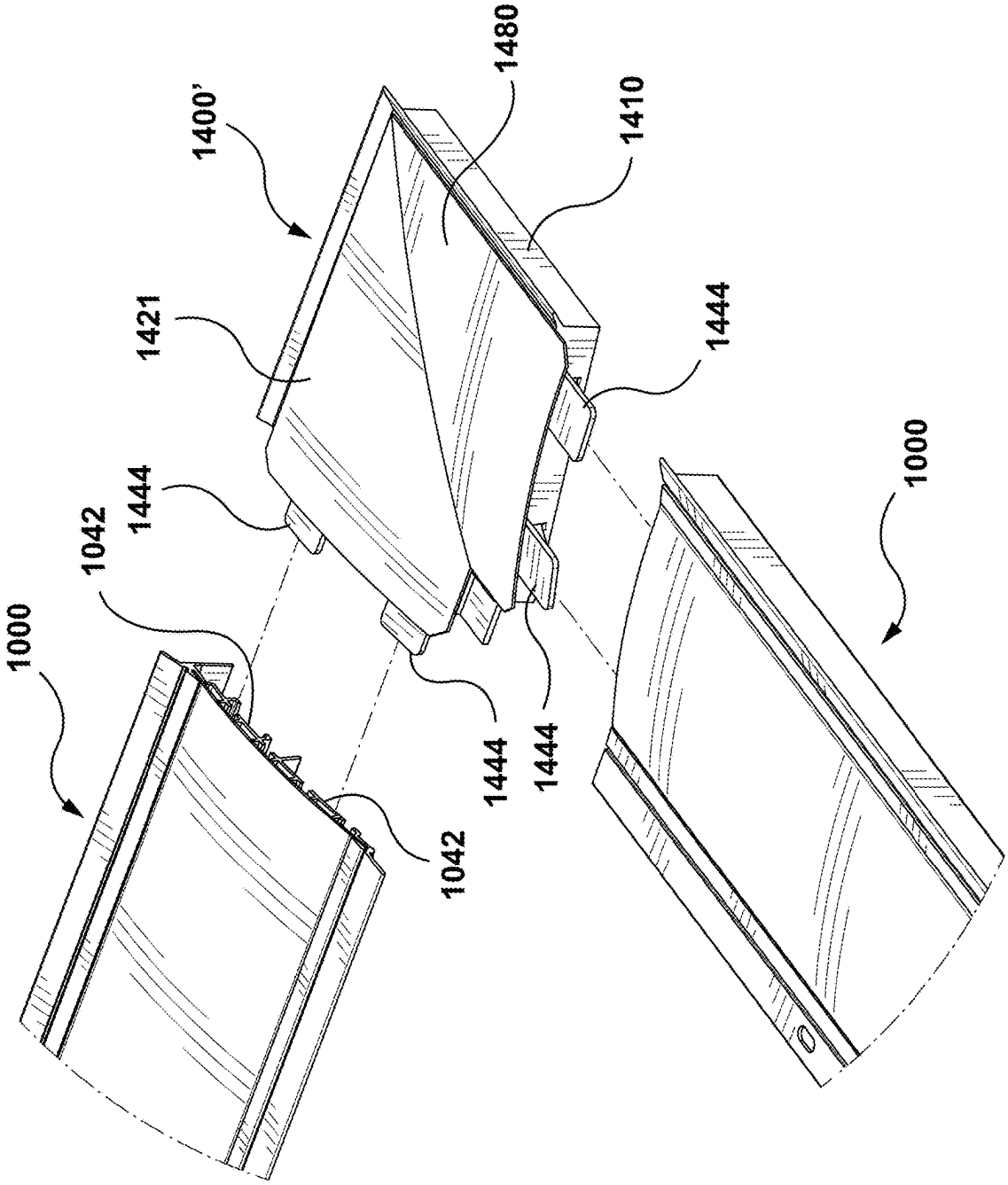

FIG. 14B

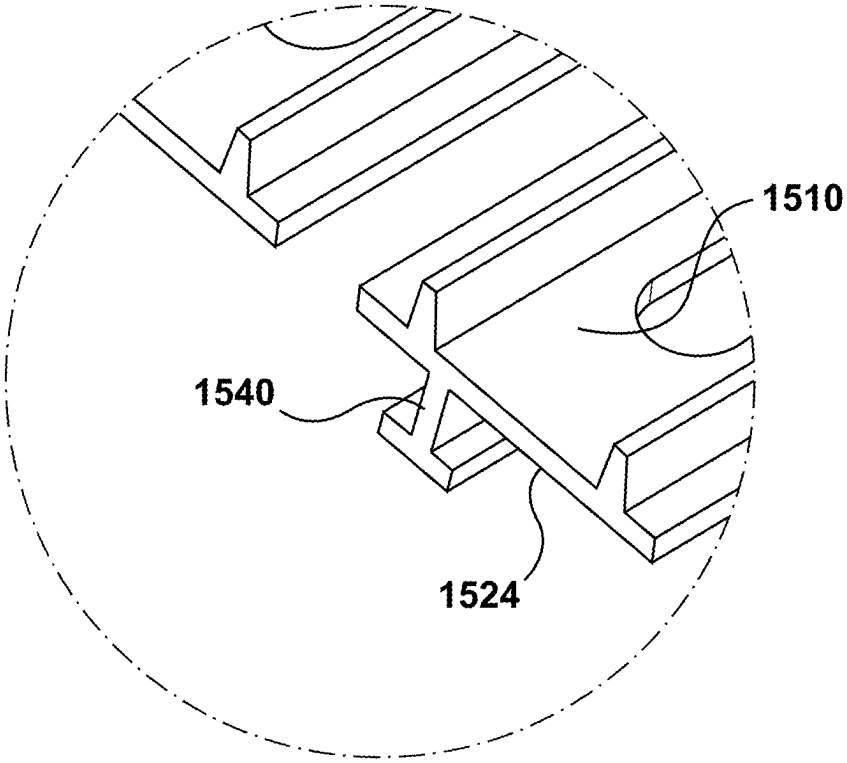

FIG. 15A

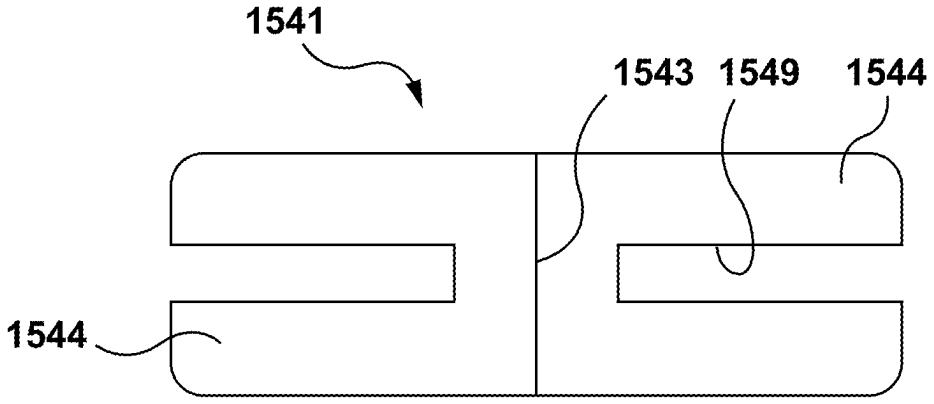

FIG. 15B

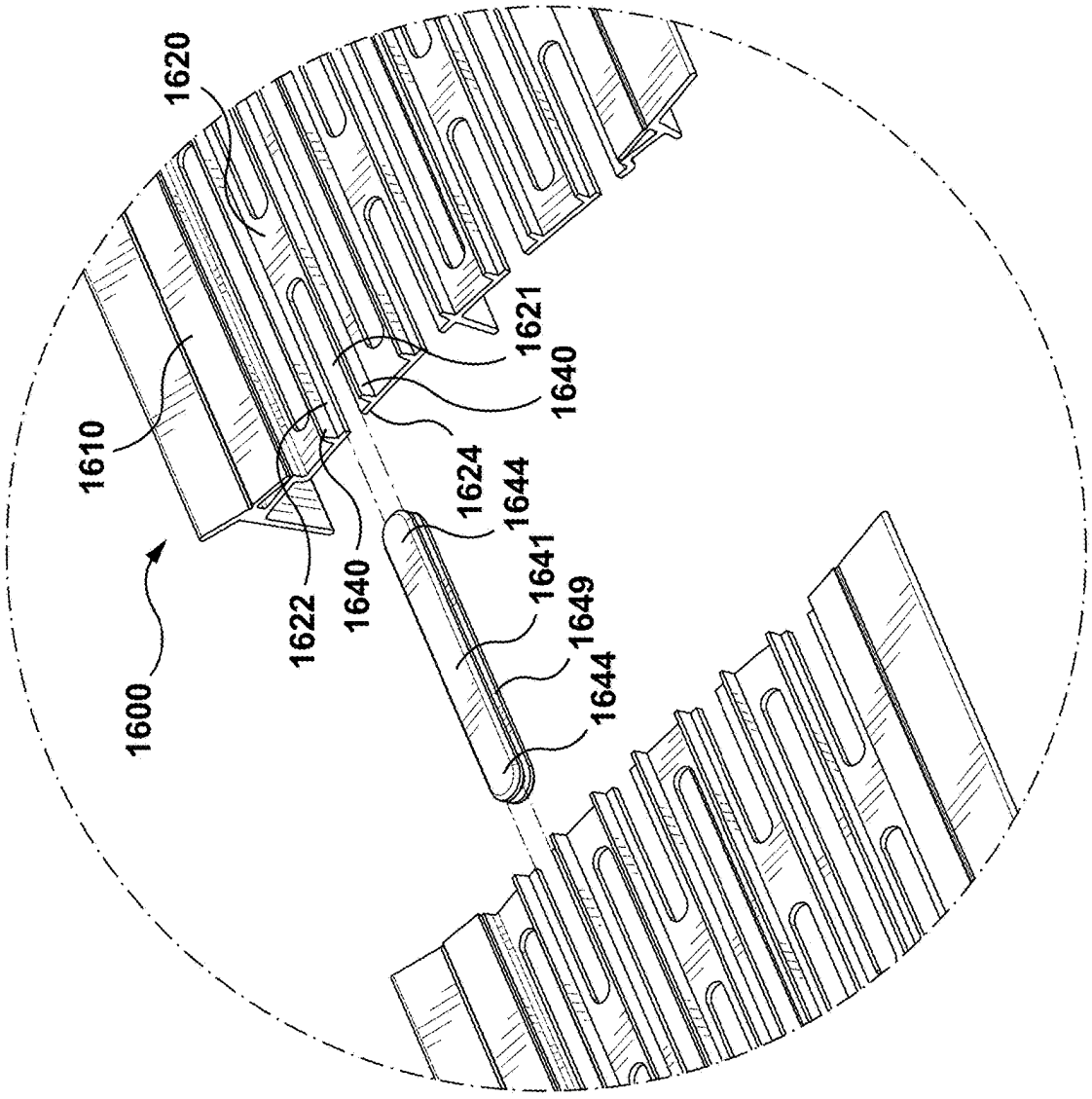

FIG. 16

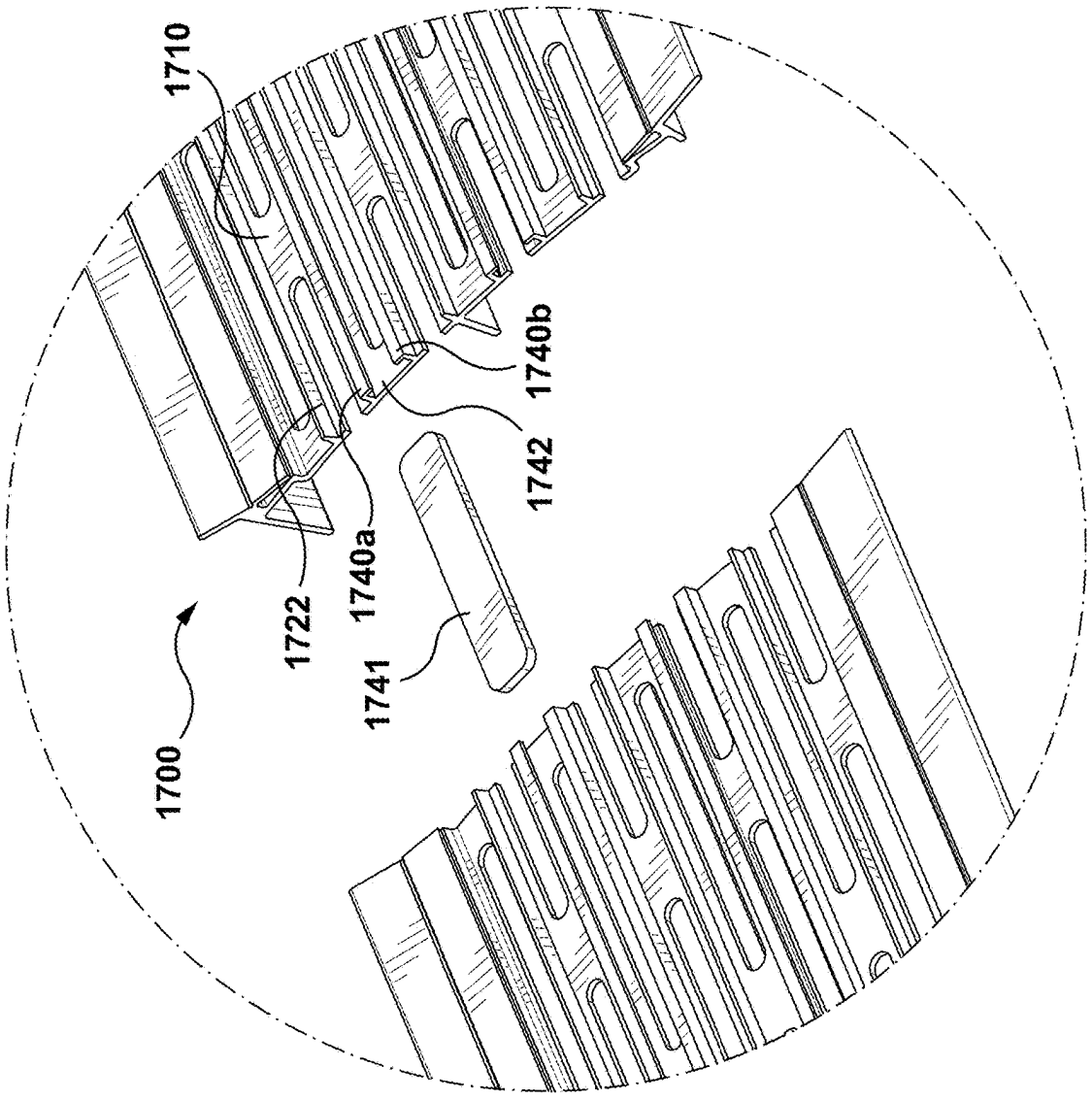

FIG. 17

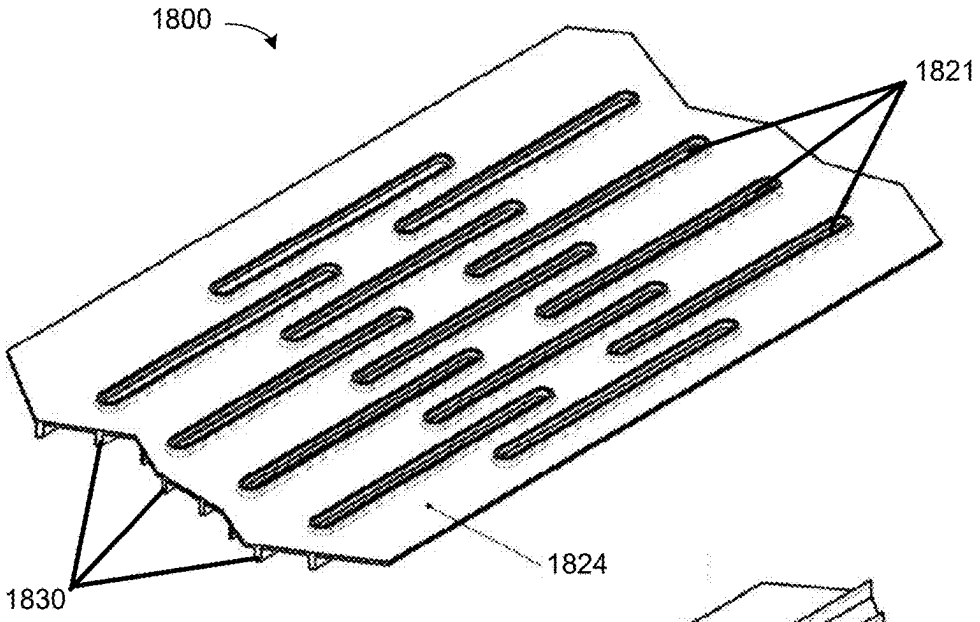

Figure 18A

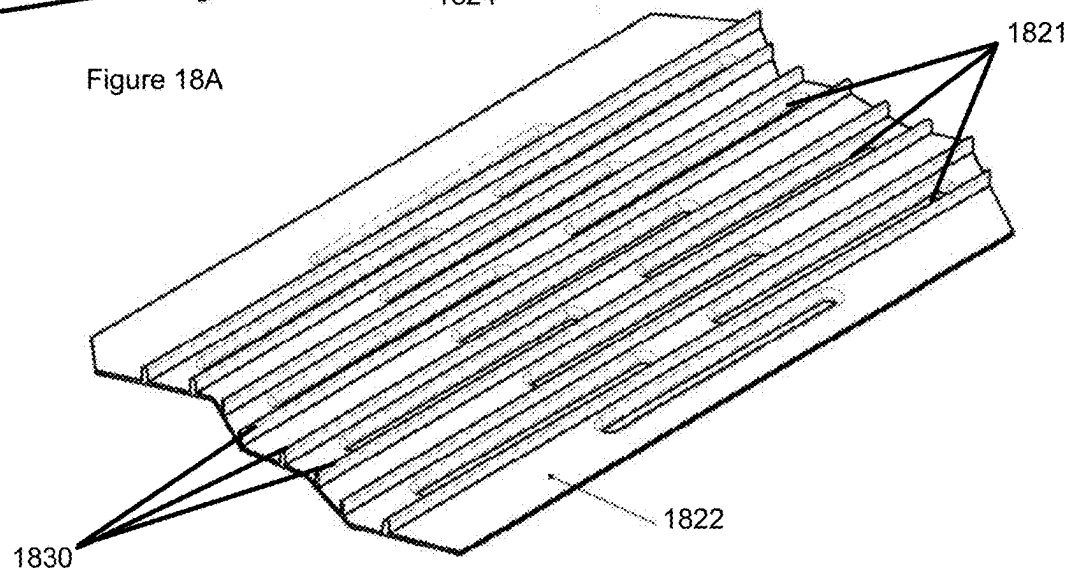

Figure 18B

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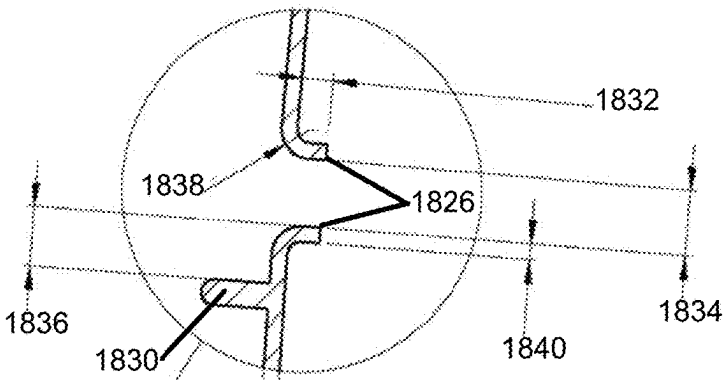


Figure 18E

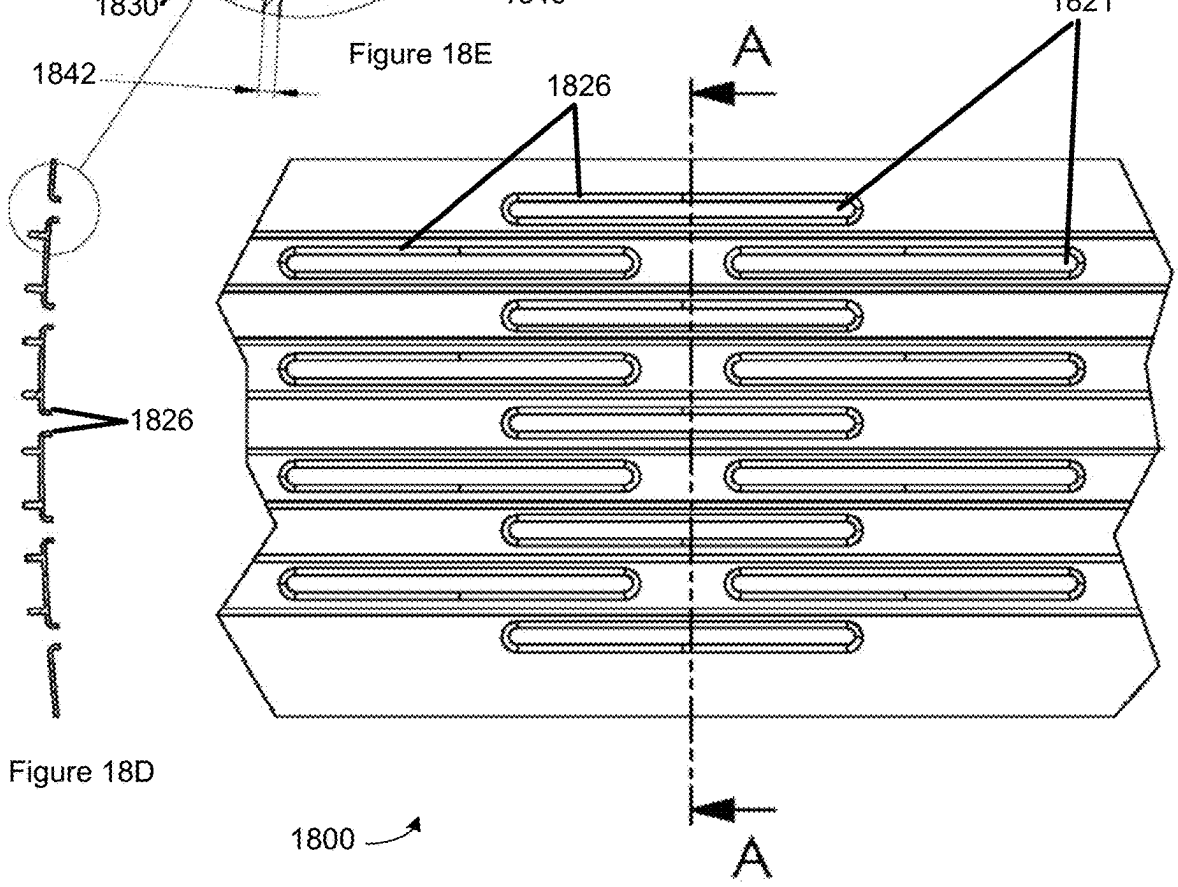


Figure 18D

Figure 18C

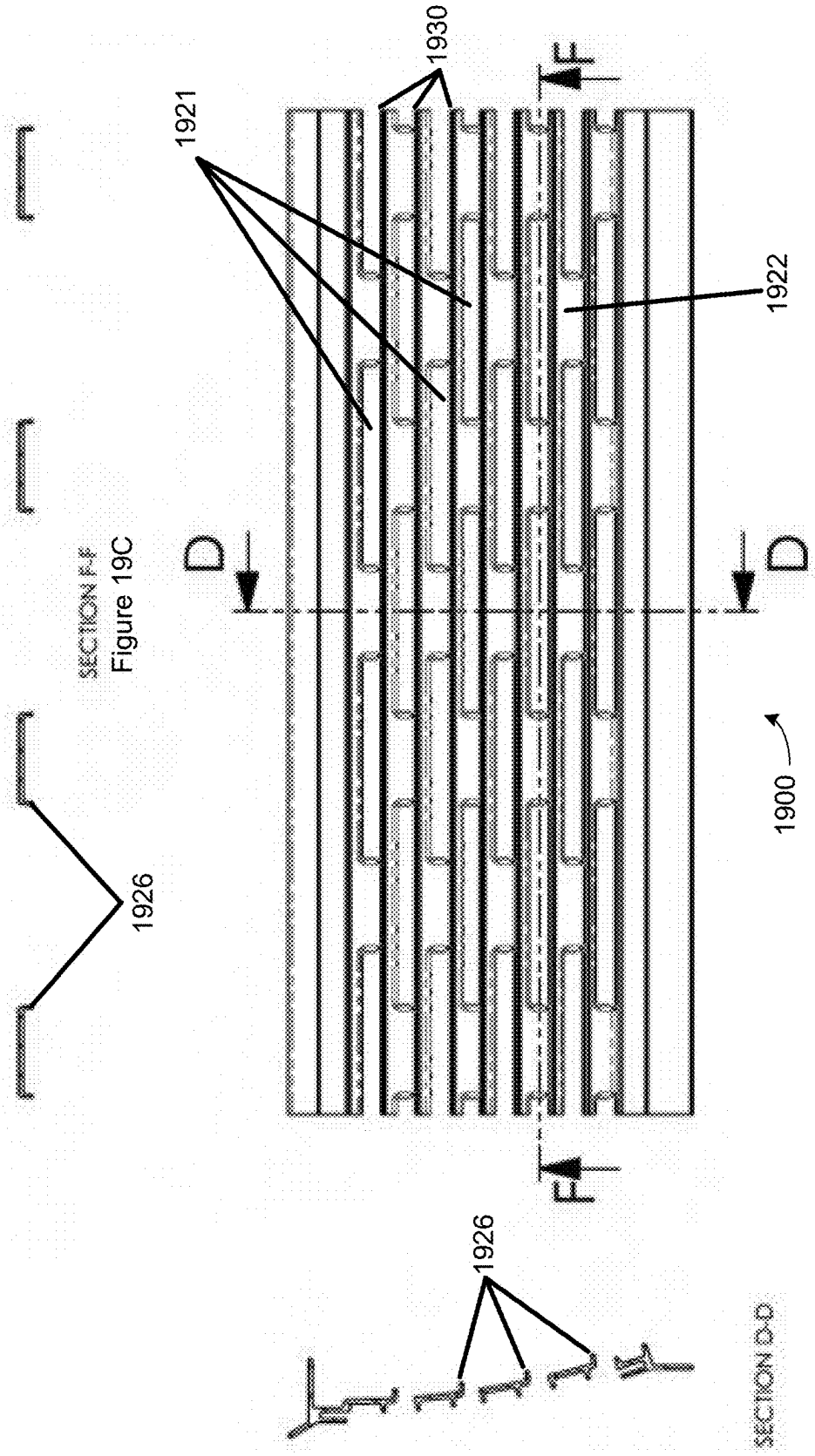
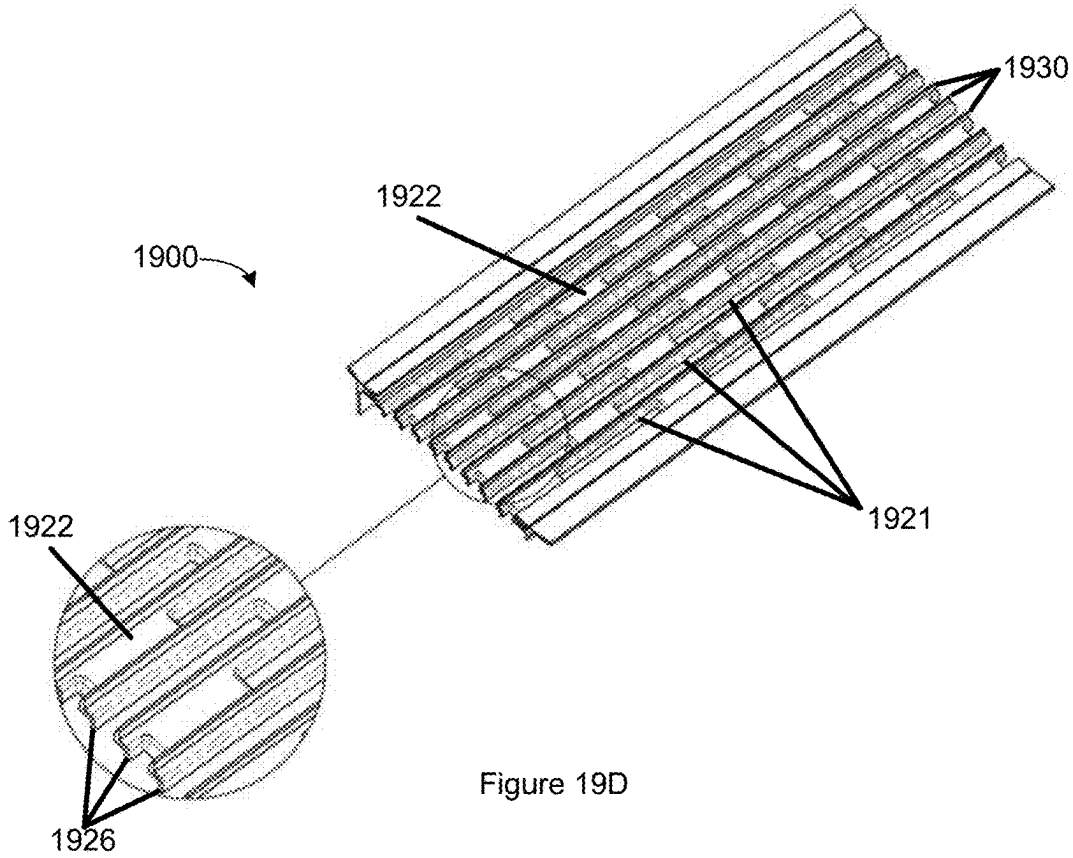


Figure 19A

Figure 19B

Figure 19C



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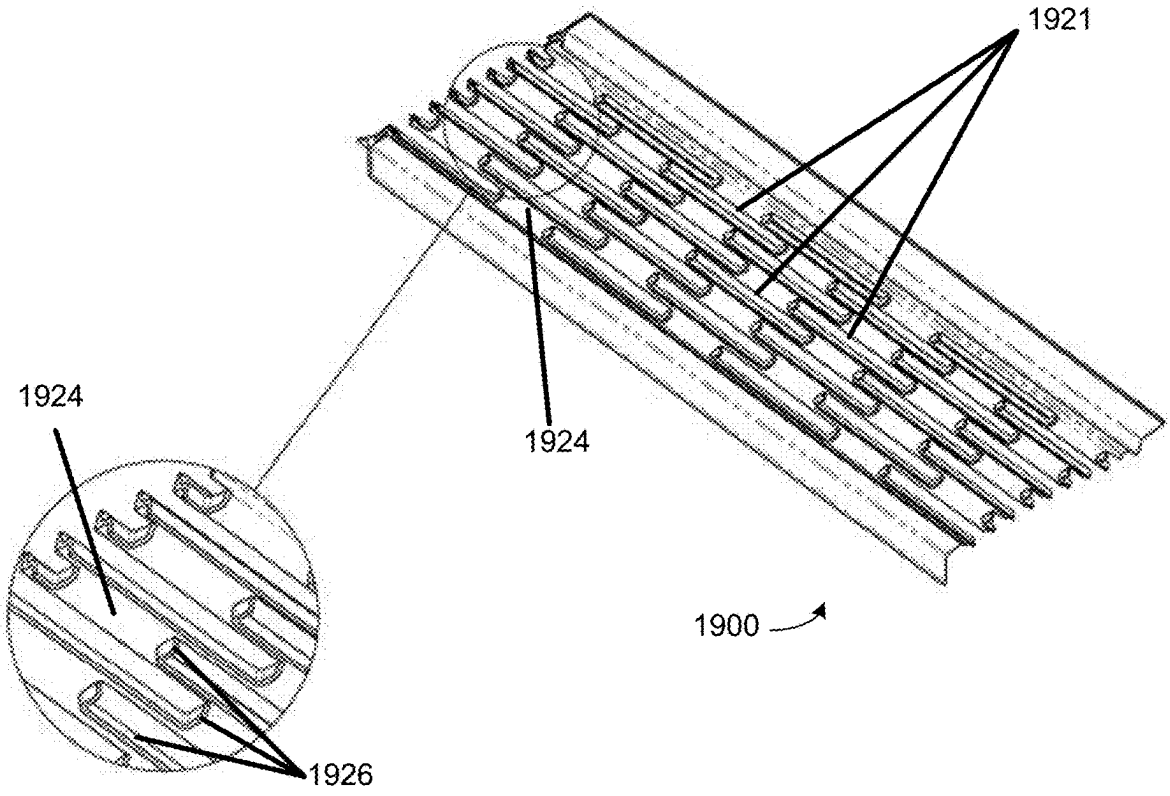


Figure 19E

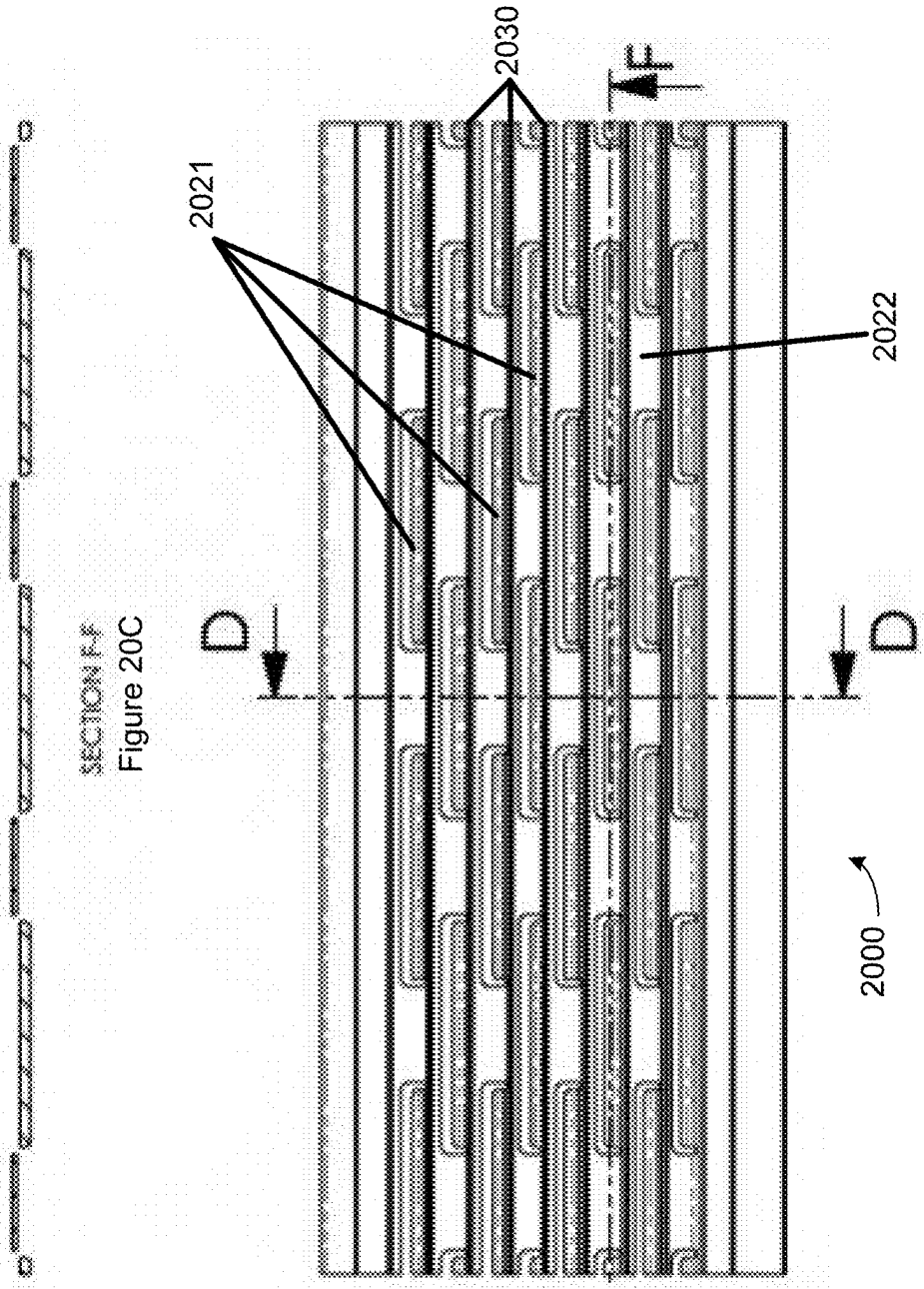
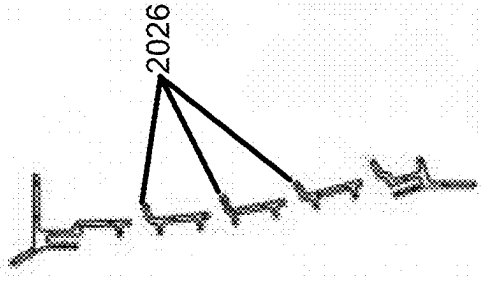


Figure 20A

SECTION F-F

Figure 20C



SECTION D-D

Figure 20B

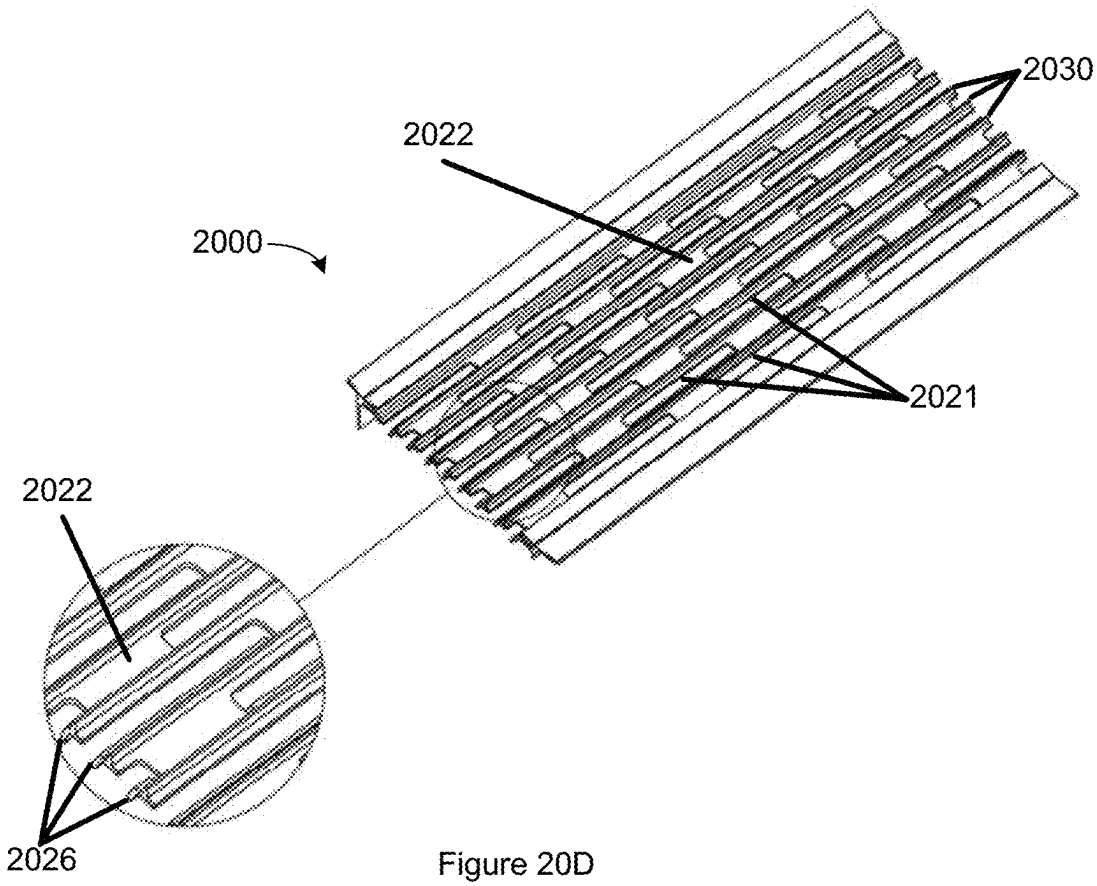


Figure 20D

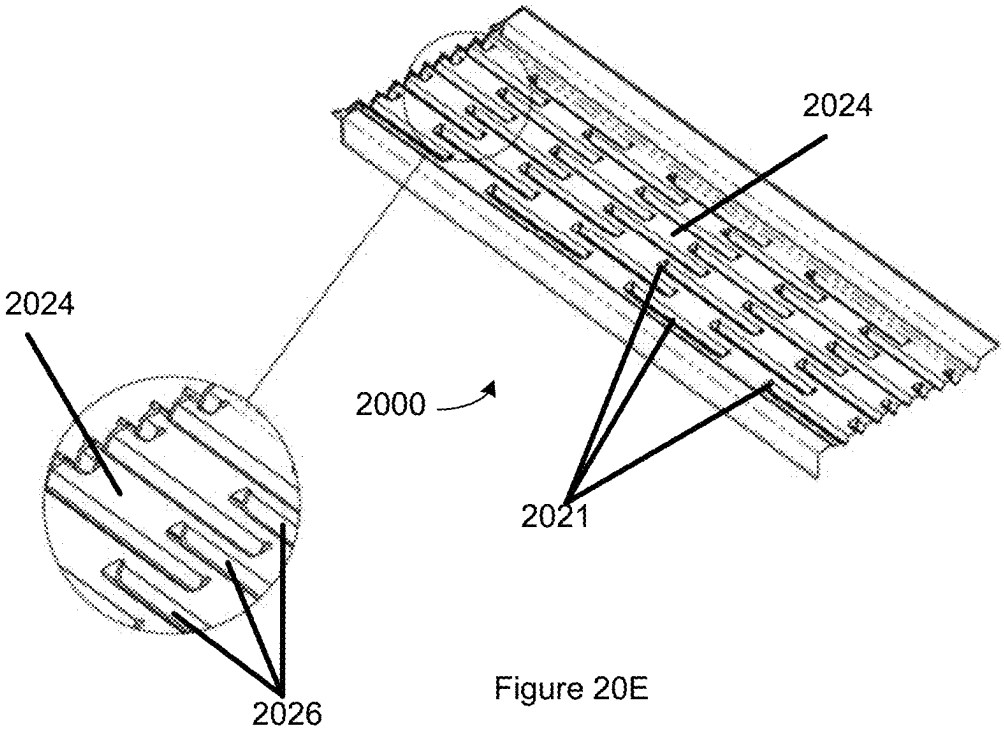


Figure 20E

EAVESTROUGH DEBRIS GUARD

CROSS-REFERENCE TO OTHER APPLICATIONS

The disclosure claims priority from U.S. Provisional Application No. 63/104,119 filed Oct. 22, 2020 and is a continuation-in-part of U.S. patent application Ser. No. 16/829,682 filed Mar. 25, 2020 both of which are incorporated herein by reference.

FIELD

The disclosure relates to a cover for an eavestrough or gutter that blocks debris from entering the eavestrough.

BACKGROUND

To protect the foundations of buildings, eavestroughing, also known as a gutter is installed under the edge of a roof to collect and manage the flow of rainwater off of the roof and away from the base of the building. Leaves, pine needles, and other debris dropped onto the roof can collect in the eavestroughs, this in turn can clog the eavestroughs and downspouts causing the rainwater to overflow the eavestrough and collect around the base of the building. Debris guards can be installed on eavestroughs to prevent the debris from entering the eavestrough while still allowing the water to flow through. Every building has a custom layout of eavestrough to match the shape of the roof line, therefore the installation of the debris guard must be customized on site to match the size and shape of the building eavestrough layout. The debris guard must be simple and quick to install, it is important to avoid misalignment and large gaps between pieces. Misalignment and gaps can become hang up areas for debris which will eventually build up and possibly clog or damage the debris guard, or they may allow for debris to pass between the pieces of debris guard into the eavestrough which can then be clogged. When eavestroughs are to be used for rainwater harvesting for grey water use any debris that passes into the eavestrough can taint the collected rainwater.

The adhesive characteristics of water can compel rainwater to cling to the surface of an eavestrough or gutter cover surface with a bond stronger than gravity can overcome for effective water penetration through the cover. The same property of water results in a surface tension that can create a film to occur over a cover opening that is stronger than the gravitational force acting upon it preventing rainwater to drain through the opening. An eavestrough or gutter cover should effectively permit water to pass through it and drain into an eavestrough or gutter to prevent water from or reduce the likelihood or water backing up and spilling over the front of the eavestrough or gutter, prevent water from or reduce the likelihood or water accumulating in the cover and freezing and to prevent water from or reduce the likelihood of water running down the length of the cover and spilling over the end of the eavestrough or gutter around the foundation of a building.

SUMMARY

In select embodiments, the present disclosure provides a debris guard for installation on an eavestrough. The debris guard includes a frame having a back side, a front side, a length, two ends, a top surface, a bottom surface opposite the top surface, and a water collection portion extending from the front side to the back side and along the length of the frame between the two ends. The water collection portion includes a plurality of holes to allow rainwater to pass through. The water collection portion also includes a plurality of drip legs coupled to the plurality of holes, the plurality of drip legs extending below the bottom surface to provide improved water flow through the eavestrough debris guard. Each of the plurality of holes includes at least one drip leg.

In select embodiments, each of the plurality of drip legs is coupled to one of four sides of each of the plurality of holes. In select embodiments, each of the plurality of drip legs extends along a portion of the one of the four sides. In select embodiments, each of the plurality of drip legs has an edge thickness thinner than an extrusion thickness of the frame. In select embodiments, the plurality of drip legs extend below the bottom surface at an angle of less than or equal to 90 degrees.

In select embodiments, the plurality of holes have an elongated shape. In select embodiments, wherein the plurality of holes allow water to pass through to the eavestrough. In select embodiments, the debris guard further includes a mesh fastened to the frame and positioned to cover the water collection portion. In select embodiments, the frame further comprises a plurality of mesh supports extending from the top surface.

In select embodiments, the frame further includes a connector engagement structure extending outward from the water collection portion. In select embodiments, the connector engagement structure extends along the length of the frame. In select embodiments, the connector engagement structure extends outward from a bottom surface of the water collection portion. In select embodiments, the connector engagement structure is a pair of connector engagement structures spaced apart.

In select embodiments, the debris guard further includes a connector, wherein the pair of connector engagement structures and one of the top surface or the bottom surface form a connector receiving opening on each end of the frame that is shaped to receive the connector. In select embodiments, the connector has a fastener portion and the connector receiving opening is shaped to receive the fastener portion of the connector in a snug slide fit. In select embodiments, the connector has a central portion with fastener portions spaced apart and extending outwardly from each side of the central portion. In select embodiments, the connector further comprises a joint covering portion along a length of the central portion for covering ends of lengths or pieces of the frame when joined to each other. In select embodiments, the plurality of drip legs is coupled to the plurality of holes via a plurality of acute or radiused edges.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other features and advantages of the disclosure will be apparent from the following description of embodiments thereof as illustrated in the accompanying drawings. The accompanying drawings, which are incorporated herein and form a part of the specification, further serve to explain the principles of the disclosure and to enable a person skilled in the pertinent art to make and use the disclosure. The drawings are not to scale.

FIG. **1** is a perspective view of a length of an embodiment of a debris guard;

FIG. **1**A is a magnification of a portion A of the debris guard of FIG. **1**;

FIG. 1B is a magnification of a portion B of the debris guard of FIG. 1 identified in

FIG. 1A;

FIG. 2A is a cross-sectional exploded view of a pre-assembled debris guard shown in FIG. 1;

FIG. 2B is a cross-sectional view of an intermediate stage of manufacturing for the debris guard shown in FIG. 1;

FIG. 2C is a cross-sectional view of an assembled debris guard shown in FIG. 1;

FIG. 3 is a magnification of a mesh engagement structure of FIG. 2A shown in cross-section and in an open position;

FIG. 4 is an alternative manufacturing method for a debris guard in accordance with an embodiment hereof;

FIG. 5A is a cross-sectional view of a debris guard in accordance with another embodiment, showing a first manufacturing step;

FIG. 5B is a cross-sectional view showing a second step of a manufacturing method for the debris guard shown in FIG. 5A;

FIG. 6 is an exploded perspective view of an example layout of a debris guard and connectors in accordance with an embodiment hereof;

FIG. 7 is an exploded perspective view of an example layout of a debris guard and another embodiment of connectors;

FIG. 8 is an exploded perspective view of an eavestrough and debris guard just prior to installation;

FIG. 9 is a cross-sectional view of the debris guard installed into an eavestrough in accordance with an embodiment hereof;

FIG. 10 shows a perspective view of a length of an embodiment of a debris guard;

FIG. 10A is a magnification of a portion A of the debris guard of FIG. 10;

FIG. 10B is a magnification of a portion B of the debris guard of FIG. 10 identified in

FIG. 1A;

FIG. 11A is a perspective view of an example layout of debris guard pieces connected together by connectors in accordance with an embodiment hereof;

FIG. 11B is an exploded perspective view of the example layout shown in FIG. 11A of a debris guard and connectors in accordance with an embodiment hereof;

FIG. 12 is a perspective view of a connector embodiment;

FIG. 12A is a top view of the connector of FIG. 12;

FIG. 12B is a cross section through section B in FIG. 12;

FIG. 13A is a perspective exploded view of a connector embodiment;

FIG. 13B is a perspective view of connector of FIG. 13A connecting two pieces of debris guard;

FIG. 14A is an embodiment of a pre-made corner piece of debris guard without mesh;

FIG. 14B is the pre-made corner piece of debris guard from 14A with mesh;

FIG. 15A is an embodiment of connector engagement structure for a debris guard;

FIG. 15B is a top view of a connector embodiment;

FIG. 16 is a perspective view of another embodiment of a debris guard and connector;

FIG. 17 is a perspective view of another embodiment of a debris guard and connector;

FIG. 18A is a bottom perspective view of a water collection portion in accordance with an embodiment hereof;

FIG. 18B is a top perspective view of the water collection portion identified in FIG. 18A;

FIG. 18C is a top view of the water collection portion identified in FIG. 18A;

FIG. 18D is a cross-sectional view of the water collection portion identified in FIG. 18A;

FIG. 18E is a magnification of a portion of FIG. 16D;

FIG. 19A is a top view of another embodiment of an eavestrough debris cover having improved water flow-through;

FIG. 19B is a cross-sectional view of the debris cover of FIG. 19A along line D-D from

FIG. 19A;

FIG. 19C is a cross-sectional view of the debris cover of FIG. 19A along line F-F from FIG. 19A;

FIG. 19D is a top perspective view of the debris cover of FIG. 19A, with a portion shown in magnification;

FIG. 19E is a bottom perspective view of the debris cover of FIG. 19A, with a portion shown in magnification;

FIG. 20A is a top view of another embodiment of an eavestrough debris cover having improved water flow-through;

FIG. 20B shows a cross-sectional view of the debris cover of FIG. 20A along line D-D from FIG. 20A;

FIG. 20C shows a cross-sectional view of the debris cover FIG. 20A along line F-F from FIG. 20A;

FIG. 20D shows a top perspective view of the debris cover FIG. 20A, with a portion shown in magnification; and

FIG. 20E shows a bottom perspective view of the debris cover FIG. 20A, with a portion shown in magnification.

DETAILED DESCRIPTION

Specific embodiments of the present disclosure are now described with reference to the FIGs, wherein like reference numbers indicate identical or functionally similar elements. The following detailed description is merely exemplary in nature and is not intended to limit the disclosure or the application and uses of the disclosure. Directional terms used within the specification are with respect to the way in which the drawing is presented unless otherwise described. Furthermore, there is no intention to be bound by any expressed or implied theory presented in the preceding technical field, background, brief summary or the following detailed description.

FIG. 1 is a perspective view of a debris guard **100** and FIG. 1A shows a magnification of portion A, where further details of the debris guard **100** will be described. In the embodiment shown, debris guard **100** has a frame **110** and a mesh **180**, which are fastened together to form the debris guard **100**. In FIGS. **1** and **1**A a portion of the mesh **180** is cut away purely for illustrative purposes to show the frame **110** underneath. Frame **110** has back side **112** and a front side **114** and a length L, when installed in the eavestrough the back side **112** is adjacent the building (not shown). A rear flange or lip **170** extends from the back side **112** at an angle to direct rainwater and debris from the roof (not shown) to the water collection portion **120**. A first rear mesh engaging portion **150** is located forward of the rear flange **170** towards the front side **114** of the frame **110**. Water collection portion **120** extends forward from first mesh engaging portion **150** to a second front mesh engaging portion **151**, therefore the water collection portion **120** extends between the two mesh engaging portions **150**, **151**. The mesh engaging portions **150**,**151** extend down from and are at a roughly 90 degree angle relative to the water collection portion **120** of the frame **110**. The mesh engaging portions **150**,**151** extend along the length of the frame **110** and receive edges of the mesh **180** to fix the mesh **180** to the frame **110** covering the water collection portion **120**. Mesh engaging portions **150**, **151** also provide the vertical location/position and support

for the debris guard **100** when installed into the eavestrough, and therefore they will also be referred to as vertical debris guard support portions. A forward flange or eavestrough fastening portion **160** extends forward from the second front mesh engaging portion **151** and to the front side **114** of the frame **110** and along the length of the frame **110**. Fastening portion **160** has holes or slots **161** for receiving a fastener such as a screw (not shown).

Frame **110** further includes mesh supports **130** extending upward from the top surface **122** of the water collection portion **120**. Mesh supports **130** make contact with the mesh **180** to keep a space or gap between the mesh **180** and the top surface **122** of the water collection portion **120**, this allows air flow to dry the debris guard **100**. Mesh supports **130** also draw and guide the rainwater down from the mesh **180** onto the top surface **122** of the water collection portion **120** which has number of slots or holes **121** to allow the rainwater to pass through, in the embodiments shown they are elongated slot shaped but they could be any other shape. Mesh supports **130** will also prevent the mesh **180** from collapsing during use. The mesh supports **130** shown in this embodiment are roughly perpendicular to the surface of the water collection portion **120**, spaced apart from each other, are straight, the same height, continuous, and extend along the length L of the debris guard **100**, therefore they also in pairs form channels between them to direct the water flow along the debris guard. It should be understood that the shape, angle, height, variation in height, number and continuity of the mesh supports can be different from what is shown as long as they provide enough support to maintain the gap and prevent the collapse of the mesh **180**. Increasing the contact the mesh supports **130** have with the mesh **180** will increase the water transfer rate through the mesh **180**. Another way to increase the water transfer rate through the mesh **180** is to increase the surface area of the mesh **180** by providing a curved profile for the mesh **180**. In this embodiment the water collection portion **120** has a slightly convex curved profile in cross-section between the two mesh engaging portions **150**, **151**. It is also possible to achieve a curved mesh profile with a flat water collection portion by sizing the mesh support heights to create a convex curved profile in cross-section.

Now turning to FIG. **1**B a magnification of portion B on an end of the debris guard **100** from FIG. **1**A, multiple pairs of connector engagement structures **140***a*, **140***b* are shown in cross-sectional profile extending downward from the bottom surface **124** of the water collection portion **120** of the frame **110** and then inward, the engagement structures **140***a*,**140***b* extend along the length L of the debris guard **100**. The pair of connector engagement structures **140***a*, **140***b* along with the bottom surface **124** of the frame **110** form a connector receiving opening **142** sized and shaped to receive a connector (not shown) in a snug slide fit such that the connector can be slid into and pulled out of the connector receiving opening **142** by hand or using a hand tool, but will remain located so that separate pieces or lengths of debris guard will remain vertically aligned with one another when connected together end to end by connectors. In this embodiment shown, the connector receiving opening **142** is shaped to receive a rectangular shaped connector, however it should be understood that connector receiving opening **142** can be shaped to receive various shapes of connectors, for example round, square, etc. The use and types of connectors will be described further in FIGS. **6**, **7**, **11**-**18**.

Frame **110** as shown in FIGS. **1**, **1**A have an optional heater channel **145** for receiving a heater **148** which in some climates may be helpful to prevent ice and snow build up. Heater channel **145** is formed between a heater engagement structure **146**, a portion of the bottom surface **124** of the water collection portion **120** of the frame **110**, and the rear mesh engagement portion **150**. The heater **148** can be of a cable, tape, and/or cord type but any other appropriate heater can be used, the cable is inserted into the heater channel **145** by press fit or may be glued or pasted in. The frame **110** which is generally made from metal, such as aluminum will conduct the heat from the rear side **112** of the frame adjacent to the heater channel **145** location through to the front side **114** of the frame. It should be understood that any of the debris guard embodiments described in this application can all be equipped with a heater channel and a heater provided that the material of the frame can handle heat generated by the heater element.

FIGS. **2**A, **2**B, and **2**C will be used to describe the assembly and manufacturing of the debris guard **100**. In FIG. **2**A the mesh **180** and frame **110** of FIG. **1**A is shown in cross-section C just prior to assembly. Mesh **180** can be made from woven threads of metal or plastic (for example stainless steel). The tightness of the weave and the diameter of the threads can be varied to alter the properties of the mesh **180**. The thread diameter size selected impacts the rigidity or durability of the mesh. A larger diameter thread will provide more rigidity and durability while a smaller diameter thread may provide a finer mesh which is less rigid and durable. Smaller diameter thread sizes will allow a higher number of openings per square inch and smaller openings than a larger thread size. The thread size, spacing between threads, and number of openings can be selected to choose a hole size which will prevent the smallest size of typical debris from passing through while maximizing the ease in which water can pass through and the durability of the mesh, see Table 1 below for an example of a range of acceptable mesh choices.

TABLE 1

MESH	WIRE DIAMETER	OPENING	% OPEN
30 × 30	0.012"	0.0213"	40.80%
30 × 30	0.0095"	0.0238"	51%
30 × 30	0.0065"	0.0268"	64.80%
32 × 32	0.0065"	0.0248"	62.70%
34 × 34	0.0065"	0.0229"	60.70%
36 × 36	0.0065"	0.0213"	58.70%
40 × 40	0.010"	0.0150"	36%
40 × 40	0.0065"	0.0185"	54.80%
42 × 42	0.0055"	0.0185"	59.10%
46 × 46	0.0055"	0.0162"	55.80%
46 × 46	0.0045"	0.0172"	62.90%
50 × 50	0.009"	0.0110"	30.30%
60 × 60	0.0075"	0.0092"	30.50%
62 × 62	0.0045"	0.0116"	51.70%
70 × 70	0.0037"	0.0106"	54.90%
72 × 72	0.0037"	0.0102"	53.80%
74 × 74	0.0037"	0.0098"	52.70%
76 × 76	0.0037"	0.0095"	51.70%
80 × 80	0.007"	0.0055"	19.40%
80 × 80	0.0055"	0.0070"	31.40%
80 × 80	0.0037"	0.0088"	49.60%
84 × 84	0.0035"	0.0084"	49.80%
88 × 88	0.0035"	0.0079"	47.90%
100 × 100	0.0045"	0.055"	30.20%
105 × 105	0.003"	0.0065"	46.90%
200 × 200	0.0016"	0.0034"	46.20%
250 × 250	0.0016"	0.0024"	36%
325 × 325	0.0011"	0.002"	42%
400 × 400	0.001"	0.0015"	36%

Prior to assembly edges of mesh **180** is pre-bent less than 90 degrees downward on both sides along its length, to form

two frame engaging portions **182** and **183**. Frame engaging portions **182** and **183** extend down to form obtuse angles **184** and **185** relative to the bottom surface of central covering portion **186** and terminate in the back and front side edges **188** and **189** of the mesh **180**. The frame engaging portions **182**,**183** are sized and angled to fit into the mesh engaging portions **150**,**151** of the frame **110**. In this embodiment as shown the angles **184** and **185** are different but they could be the same.

Frame **110** is made by metal extrusion, for example aluminum. Aluminum can be extruded, is light, and does not rust. In FIG. **2**A the frame **110** is shown prior to assembly with mesh engaging portions **150** and **151** in an open state. In the open state mesh engaging portions **150** and **151** are V shaped and have inside walls **152**,**153** which are adjacent the water collection portion **120**. Further, rear mesh engaging portion **150** has an outside wall **156** adjacent to the rear flange **170** at the back side **112**, and front mesh engaging portion **151** has an outside wall **157** adjacent the eavestrough fastening portion **160** at the front side **114**. In the pre-assembled state the inside walls **152** and **153** extend down from and form obtuse angles **154**,**155** relative to the water collection portion **120**. In this particular embodiment the angles **154**,**155** shown are different however they could be the same.

FIG. **3** shows a magnification of front mesh engaging portion **151** in the open V position from FIG. **2**A to better illustrate engagement structures **159**. Multiple engagement structures **159** on the inside surfaces of the inside and outside walls **153** and **157** act together to enhance the ability of the front mesh engaging portion **151** to grip/hold the frame engaging portions **183** of mesh **180** when the front mesh engaging portion **151** is closed or crimped shut. In this particular embodiment engagement structures **159** are ridges that are peak shaped in cross-section and extend along the length of the debris guard, they are located on the inside of the V on both the inside and outside walls **153** and **157**. Engagement structures **159** are offset from each other in order to fit together when the front mesh engagement portion **151** is closed or crimped closed. Engagement structures **159** further engage and grip the frame engaging portions **183** of the mesh when the mesh engaging portion **157** is closed or crimped shut. It should be understood that the shape, size, number, and continuity of the engagement structures can be different as long as they allow the mesh engaging portion to be closed and provide enhanced grip or engagement of the mesh over a smooth surface; in fact a slightly roughed or textured surface may be sufficient. Although front mesh engaging portion **151** is shown in this FIG. rear mesh engaging portion **150** shown in FIGS. **2**A, **2**B, and **2**C also has engagement structures **159**. A closed mesh engaging portion without mesh engaging structures may provide enough grip to hold the mesh to the frame.

Frame engaging portions **182**, **183** of the mesh **180** are inserted into the open V shaped mesh engaging portions **150**, **151**. The mesh engaging portions **150**, **151** are closed by bending the outside walls **156** and **157** towards their respective inside walls **152**, **153** thereby closing the V as shown in FIG. **2**B. Once closed, mesh engaging portions **150**,**151** are further bent to reduce the original obtuse angles **154** and **155** to tighten the mesh as shown in FIG. **2**C. Final angles **154'**, **155'** are approximately 90 degrees +/−10, the mesh engaging portions **150**, **151** need to be at an angle such that they fit within and are received by the eavestrough when installed. Tightness of the mesh depends on the difference between original obtuse angles **154**, **155** and the final angles **154'**, **155'**, the large the difference the tighter the mesh becomes. Tightening the mesh prevents collapse and low spots in the mesh, reducing the likely hood that debris will stick or hang up on the debris guard **100**, as well as ensures contact with mesh supports **130** to ensure optimum transfer of water through the mesh **180**.

FIG. **4** illustrates another embodiment of a debris guard **400**. Final assembled debris guard **400** has essentially the same features as final assembled debris guard **100**, however the manufacturing method is slightly different because there is no tightening of the mesh. Frame **410** has mesh engaging portions **450** and **451** which are roughly perpendicular to the frame **410**. The frame **410** is extruded with mesh engaging portions **450** and **451**, having inside walls **452**, **453** with angles **454**, **455** which are roughly 90° relative to the bottom surface of the water engaging portion **420** of frame **410**. Mesh **480** has frame engaging portions **482** and **483**, which are pre-bent at angles **484** and **485** which are roughly 90° to match the angles of the mesh engaging portions **450** and **451**. Mesh engaging portions **450** and **451** receive frame engaging portions **482** and **483** to join the mesh **480** to the frame **410** to form the final assembled debris guard **400**. In the embodiment shown the inside walls **452**, **453** and their respective outside walls **456**, **457** are both at approximately 90° relative to the frame **410** and have a space between to receive the mesh **480**. The frame engaging portions **482**, **483** of the mesh **480** are inserted into the mesh engaging portions **450** and **451**. It should be understood that in another embodiment (not shown) it would be possible for the frame **410** to be extruded with frame engaging portions having insides walls **452**, **453** at a roughly 90 degree angle but with outside walls at another angle to form an open V shape similar to the embodiment shown in FIGS. **2**A, **2**B, **2**C and **3**. In this case the mesh engaging portions would then be closed to hold the mesh.

FIGS. **5**A and **5**B show yet another embodiment of debris guard **500** when it is desired to have the extruded frame manufactured in its final shape and configuration, no further bending or adjustments required. What in other embodiments is described as mesh engaging portions **150**, **450**, **151**, **451**, in this embodiment no longer engages the mesh and therefore will be referred to as the alternative name vertical debris guard supports **550**, **551**. Vertical debris guard supports **550**,**551** in this embodiment only provide the vertical location and support function for the debris guard **500** when installed on the eavestrough. In the embodiment shown the frame is extruded in its final shape and configuration, mesh **580** is either welded or glued to the frame **580** to form final debris guard **500**. This would be desirable when for example the frame **510** is to be made from plastic.

FIGS. **10**, **10**A, and **10**B show another embodiment of the debris guard **1000**. FIG. **10**A is an enlarged view of portion A on FIG. **10** with a portion of the mesh **1080** cut away to illustrate the frame **1010** underneath. Frame **1010** has back side **1012** and a front side **1014** and a length L, when installed in the eavestrough the back side **1012** is adjacent the building (not shown). A rear flange or lip **1070** extends from the back side **1012** at an angle to direct rainwater and debris from the roof (not shown) to the water collection portion **1020**. A first rear mesh engaging portion **1050** is located forward of the rear flange **1070** towards the front side **1014** of the frame **1010**. Water collection portion **1020** extends forward from first mesh engaging portion **1050** to a second front mesh engaging portion **1051**, therefore the water collection portion **120** extends between the two mesh engaging portions **1050**, **1051**. The main difference between the debris guard **1000** and the debris guard **100** described previously is that the frame **1010** has mesh engaging por-

tions **1050** and **1051** which are parallel to the frame. The mesh engaging portions **1050**, **1051** extend along the length of the frame **1010** and receive edges of the mesh **1080** to fix the mesh **1080** to the frame **1010** covering the water collection portion **1020**. The mesh engaging portions **1050** and **1051** of the frame **1010** are crimped down hold the mesh **1080** to the debris guard **1080**. Because the mesh engaging portions **1050**, **1051** are parallel, the frame requires a separate vertical debris guard support **1058** to provide the vertical location and support function for the debris guard **1000** adjacent the back side **1012** of the frame **1010**. A forward flange or eavestrough fastening portion **1060** extends forward from the second front mesh engaging portion **1051** and to the front side **1014** of the frame **1010** and along the length of the frame **1010**. Fastening portion **1060** has holes or slots **1061** for receiving a fastener such as a screw (not shown).

Frame **1010** further includes mesh supports **1030** extending upward from the top surface **1022** of the water collection portion **1020**. Mesh supports **1030** make contact with the mesh **1080** to keep a space or gap between the mesh **1080** and the top surface **1022** of the water collection portion **1020**, this allows air flow to dry the debris guard **1000**. Mesh supports **1030** also draw and guide the rainwater down from the mesh **1080** onto the top surface **1022** of the water collection portion **1020** which has number of slots or holes **1021** to allow the rainwater to pass through. Mesh supports **1030** will also prevent the mesh **1080** from collapsing during use. The mesh supports **1030** shown in this embodiment are roughly perpendicular to the surface of the water collection portion **1020**, spaced apart from each other, are straight, the same height, continuous, and extend along the length L of the debris guard **1000**, therefore they also in pairs form channels between them to direct the water flow along the debris guard. It should be understood that the shape, angle, height, variation in height, number and continuity of the mesh supports can be different from what is shown as long as they provide enough support to maintain the gap and prevent the collapse of the mesh **1080**. Increasing the contact the mesh supports **1030** have with the mesh **1080** will increase the water transfer rate through the mesh **1080**. Another way to increase the water transfer rate through the mesh **1080** is to increase the surface area of the mesh **180** by providing a curved profile for the mesh **1080**. In this embodiment the water collection portion **1020** has a slightly convex curved profile in cross-section between the two mesh engaging portions **1050**, **1051**. It is also possible to achieve a curved mesh profile with a flat water collection portion by sizing the mesh support heights to create a convex curved profile in cross-section.

Now turning to FIG. **10**B a magnification of portion B on an end of the debris guard **1000** from FIG. **10**A, multiple pairs of connector engagement structures **1040***a*, **1040***b* are shown in cross-sectional profile extending downward from the bottom surface **1024** of the water collection portion **1020** of the frame **1010** and then inward towards each other, the engagement structures **1040***a*,**1040***b* extend along the length L of the debris guard **1000**. The pair of connector engagement structures **1040***a*, **1040***b* along with the bottom surface **1024** of the frame **1010** form a connector receiving opening **1042** sized and shaped to receive a connector (not shown) in a snug slide fit such that the connector can be slid into and pulled out of the connector receiving opening **1042** by hand or using a hand tool, but will remain located so that separate pieces or lengths of debris guard will remain vertically aligned with one another when connected together end to end by connectors. In this embodiment shown, the connector receiving opening **1042** is shaped to receive a rectangular shaped connector, however it should be understood that connector receiving opening **1042** can be shaped to receive various shapes of connectors, for example round, square, etc. The use and types of connectors will be described further in FIGS. **6**, **7**, **11**-**14**B.

FIG. **17** shows an embodiment of a debris guard **1700** (with the mesh removed) similar to FIG. **10**, the main difference being that the connector engagement structures **1740***a* and **1740***b* extend from the top surface **1722** of the frame **1710** instead of the bottom surface. The pair of connector engagement structures **1740***a*, **1740***b* along with the top surface **1722** of the frame **1710** form a connector receiving opening **1742** sized and shaped to receive a connector **1741** in a snug slide fit such that the connector can be slid into and pulled out of the connector receiving opening **1742** by hand or using a hand tool, but will remain located so that separate pieces or lengths of debris guard will remain vertically aligned with one another when connected together end to end by connectors.

Debris guards can be made manufactured in many different lengths and then cut to suit by the installer on site at the building at the time of installation. For simplicity purposes the following descriptions related to connecting pieces of debris guard together and illustrated in FIGS. **6**,**7** and **11**-**14**B will refer to debris guard **100** or **1000**, but it should be understood that this description applies to all embodiments of debris guards shown and/or described in this application for example but not limited to debris guards **100**, **400**, **500**, and **1000**, or any debris guard having at least one pair of connector engagement structures extending down from a bottom surface of the frame and along the length of a debris guard. Connector engagement structures must extend along the length of the debris guard because the debris guard can be cut at any point along its length to fit the length of eavestrough by the installer. FIG. **6** shows an example of debris guards **100** cut to desired lengths and angles to fit an example eavestrough layout. Connectors **641***a*, **641***b*, **641***c* can be used to join multiple pieces of debris guard **100** together. By using connectors between the lengths or pieces of debris guards **100** additional strength and rigidity is achieved for the installed debris guard as well as ensuring that the pieces of debris guard are aligned flush with one another. Eavestrough hanger brackets are typically installed 16-24 inches apart and therefore will not necessarily be aligned with the locations where separate pieces of debris guard will have to come together. If the ends of the separate debris guard pieces are not supported by an eavestrough hanger bracket then they will subject to misalignment, especially in climates subject to snow and ice which would add load to the debris guard. By adding the connector, it ensures that the joint is supported and the pieces remain aligned. Connector **641***a* is connecting two angled ends of debris guards **100** to create a 90 degree inside angle. Connector **641***b* is connecting two straight edge ends of debris guards **100** to continue a straight length. Connector **641***c* is connecting two angled ends of debris guards **100** to create a 90 degree outside angle. Connectors **641***a*, **641***b*, **641***c* all have a main or central body portion **643** and fastener portions **644** extending from. In this particular embodiment the connectors **641***a,b,c* have four fastener portions **644** each, two extending from each side of the central body portion **643**, it should be understood that they could have as little as two fastener portions, one on each side the central body or more than four. Each tab **644** is received between a pair of connector engagement structures **140***a*, **140***b* on the debris guard **100**, which were first described in

FIG. **1**B and will be further described in FIGS. **8** and **9**. When the connectors **641***a*, **641***b*, **641***c* are fully inserted into the debris guards **100**, the central body **643** of the connectors **641***a*, **641***b*, **641***c* will make contact with and act as a stop for the edge of the debris guard **100** lengths.

FIG. **7** illustrates the same example layout as shown in FIG. **6** but with a different style of connectors. Two connectors **741***a* are used to connect two angled ends of debris guards **100** to create a 90 degree inside angle; each connector **741***a* has two fastener portions **744** one received in one piece of the debris guard **100**, the other in a second piece of debris guard **100**. Two connectors **741***c* are used to connect two angled ends of debris guards **100** to create a 90 degree outside angle; each connector **741***c* has two fastener portions **744** one received in one piece of the debris guard **100**, the other in a second piece of debris guard **100**. Connector **741***b* is connecting two straight edge ends of debris guards **100** to continue a straight length. Connector **741***b* also has two fastener portions **744**, one received in an end of a first length of debris guard **100** and the other received in an end of a second length of debris guard, bumps/crimps **743** in the center of the connector **741***b* act as a stop for the edge of the debris guard **100** lengths to prevent them from touching or overlapping. It is possible to add similar bumps/crimps to the angle connectors **741***a* and **741***b*. Each fastener portion **744** is received between a pair of connector engagement structures **140***a*, **140***b* on the debris guard **100**, which were first described in FIG. **1**B and will be further described in reference to FIGS. **8** and **9**. Although two connectors **741***a*, **741***b*, **741***c* are shown between pieces of debris guard **100** it should be understood that it is possible to have only one or more that two. FIG. **7** also shows end caps **745** which can be attached to cut ends of the debris guard **100** to cover the cut end of the debris guard **100** pieces or lengths. It is possible that rough edges may be created when the lengths of debris guard are cut. End cap **745** shown has an end surface **747** with fastener portions **744** which extend perpendicular from the end surface **747**. Fastener portions **744** are shaped to be received in the connector engagement structures **140***a*, **140***b* on the debris guard **100** and end surface **747** covers the cut edge of debris guard **100**.

FIG. **11** illustrates a similar layout as shown in FIGS. **6** and **7** however instead of using angled connectors, the debris guard comes in debris guard straight lengths **100** which are cut and pre-made corners **100'**. The benefit to the pre-made corners **100'** is that the installer will only need to make straight cuts of the debris guard and will not be required to cut any angles. Because all ends of debris guard **100** and **100'** are straight edges the connectors can also be straight along their length and only one type and size of connector is needed. Connector **1141** has two fastener portions **1144** one received in one piece of the debris guard **100**/**100'**, the other in an end of a second piece/length of debris guard **100**/**100'**, bumps/crimps **1143** in the center of the connector **1141** act as a stop for the edge of the debris guard **100** lengths to prevent them from touching or overlapping. Connector **1141** is shown connecting two straight edge ends of debris guards **100** to continue a straight length, as well as showing a connection between a straight length **100** and a pre-made corner **100'**. Each fastener portion **1144** is received between a pair of connector engagement structures (not shown) on the debris guard **100**, engagement structures were first described in FIGS. **1**B and **10**B and will be further described in reference to FIGS. **8** and **9**. Although only one connector **1141** between pieces of debris guard **100**, **100'** are shown however it is possible to have a debris guard with more than one pair of connector engagement structures use two or more connectors **1141**. FIG. **11** also shows end caps **1145** which can be attached to cut ends of the debris guard **100** to cover the cut end of the debris guard **100** pieces or lengths. It is possible that rough edges may be created when the lengths of debris guard are cut, end caps cover the rough edges to prevent debris hang up as well as prevent entry of rodents, debris, insects, birds, etc into the eavestrough. End cap **1145** shown has an end surface **1147** with fastener portion **1144** which extend perpendicular from the end surface **1147**. Fastener portions **1144** on the end cap **1145** are the same as fastener portions **1144** and shaped to be received in the connector engagement structures on the debris guard **100** such that end surface **1147** covers the cut edge of debris guard **100**.

FIGS. **12**, **12**A, and **12***b*, show an example of a connector **1241** that could be used with any of the debris guards described herein. Connector **1241** has two fastener portions **1244** one to be received in one piece of the debris guard and the other another piece of debris guard to join them together. Each fastener portion **1244** extends outward from a central portion **1243** which is shaped to be slightly larger in profile then the fastener portions **1244** so that central portion be larger than the connector receiving opening (not shown) in the debris guard (not shown). This ensures a stop between pieces of connected debris guard so that they are unable to crush against each other and ensures that substantially equal amounts of fastener portions **1244** extend into each piece of debris guard. The fastener portions **1244** provide additional rigidity and support to connected pieces of debris guard. As illustrated in FIG. **12**B connector **1241** has a slightly wavy cross-section, the wave shape forms ridges and valleys which enhance the overall strength of the connector **1241**, which in turn translates into further rigidity and strength to connected pieces of debris guard. This is an optional enhancement and could be achieved using other geometries.

FIGS. **13**A and B show another embodiment of a connector **1341**, FIG. **13**A shows the connector **1341** just prior to joining two pieces of debris guard **1000** together. Connector **1341** has a central portion **1343** with two fastener portions **1344** spaced apart and extending outwardly from each side of the central portion **1343**. The central portion **1343** extends upward form the connector **1341** to a height that will clear the top of the debris guard **1000** when installed, once past this height the central portion **1343** widens to form a joint covering portion **1347**. When the connector **1341** is installed as shown in FIG. **13**B to connect two lengths of debris guard **1000** the joint covering portion **1347** covers the cut edges of the debris guard **1000** lengths. Covering the edges may help prevent the rough edges from catching leaves and other debris and prevent debris from passing between the joined lengths of debris guard. The central portion **1343** which is located between the joined debris guard **1000** pieces acts as a stop to prevent overlapping of the debris guard pieces **1000**. Although this example shows two fastener portions **1344** per side of the connector **1043**, it could still work with a single fastening portion per side or more that two.

FIGS. **14**A and **14**B illustrate another debris guard pre-made corner **1400'** embodiment that does not require separate connectors to join to straight lengths of debris guard **1000**. An outside 90 degree pre-made corner **1400'** is shown in this example. Pre-made corner **1400'** is shown without a mesh layer in FIG. **14**A to illustrate the frame **1410** having a rainwater collection portion **1420** with openings **1421** to allow rainwater to pass through, extending from the corner piece are fastener portions **1444**, two on each inside side. Fastener portions **1444** are received into connector receiving

openings **1042** (as previously described in reference to FIGS. **10**, **10**A, and **10**B) on each piece of straight debris guard lengths **1000**. FIG. **14**B shows pre-made corner **1400'** with the mesh **1480** attached to the frame **1410** covering the rainwater collection portion (not shown).

Although the connector embodiments described and illustrated previously show fastener portions which are rectangular or tab shaped it should be understood that it is possible to for connectors to have fastener portions that are other shapes for example cylindrical, tapered, triangular, etc. Connectors should also be designed so that their overall installed profile is such that they minimize the chance to create hang up spots for debris.

All connector embodiments described thus far require a pair of connector engagement structures however it is possible to have a connector that will work with a single connector engagement structure as illustrated in FIGS. **15**A and **15**B. FIG. **15**B shows a connector **1541** that will work with the single connector engagement structure **1540** shown in FIGA. Connector engagement structure **1540** extends straight down from the bottom surface **1524** of frame **1510** and then extends outward to form a T shape in cross section. Connector **1541** has a central portion **1543** and two fastener portions **1544** extending outwardly, one fastener portion **1544** to be received in one piece of the debris guard and the other fastener portion **1544** to be received in another piece of debris guard to join them together. Each fastener portion **1544** has a cut-out or slot **1549** which is sized and shaped to receive the connector engagement structure **1540** in a snug slide fit such that the connector can be slid onto and pulled off of the connector engagement structure **1540** by hand or using a hand tool, but will remain located so that separate pieces or lengths of debris guard will remain vertically aligned with one another when connected together end to end by connectors. The central portion **1543** is solid and therefore provides a stop between the fastener portions **1544** to prevent the connected pieces of debris guard from overlapping. In this embodiment the connector engagement structure **1540** has a T shaped in cross section but it could be a different shape as long as it is matched to the slot or cut-out **1549** in the connector **1541** to hold and locate the connector in place relative to the frame **1510**.

FIG. **16** shows an embodiment of a debris guard **1600**, having a frame **1610** with a water collection portion **1620**, the water collection portion having slots or holes **1621** for allowing rainwater to pass through, a top surface **1622** and a bottom surface **1624**. The frame **1610** having a pair of spaced apart connector engagement structures **1640** extending up from the top surface **1622** of the water collection portion **1620** of the frame **1610**. The connector **1641** shown has fastener portions **1644** on each end for engaging with two separate pieces of debris guard **1610** to connect them together. Connector **1641** further has a cut-out **1649** which in this embodiment is a slot which runs along the outside side surface of the connector **1641** including the faster portions **1644**. Connector **1641** is inserted between connector engagement structures **1640** so that the cut-out **1649** is received into slot **1621** such that when installed a portion of the connector **1641** is above the top surface **1622** and a portion of the connector **1641** is below the bottom surface **1624** of the frame **1610**. Similar to previous embodiments described herein, the connector **1641** has a snug slide fit engagement with the debris guard **1600**.

In the following paragraphs making reference to FIGS. **8** and **9** the installation onto the eavestrough and operation of the debris guard will be described, although it will be described with reference to debris guard embodiment **100** it should be understood that this description applies to all embodiments of debris guards shown and/or described in this application for example but not limited to debris guards **100**, **100' 400**, **500**, **1000**, and **1400'** shown in FIGS. **4**, **5**A, and **5**B, **11**A, **11**B,**10**, **10**A,**10**B, and **14**A, and **14**B. FIG. **8** shows the debris guard **100** just prior to assembly and FIG. **9** shows the debris guard **100** installed into a typical eavestrough in cross-section. Although only debris guard **100** in shown installed, embodiments of debris guard described and are installed in the same way. Eavestrough **1** is secured to the building wall **8** just under the roof edge **9** by a plurality of eavestrough hanger brackets **2**. Eavestrough **1** has a rear wall extending down, a bottom wall **7** extend outwards from the rear wall and a front wall **4** extending upward from the bottom wall **7** to form a trough which collects the rainwater. Rear wall **3** is attached to the building by a screw **6** goes through the building side or rear end of eavestrough hanger bracket **2** then through the rear wall **3** of the eavestrough and finally into the building **8**. Front wall **4** terminates at a flange or lip which is used to receive the other or front end of eavestrough hanger bracket **2**. The front end of eavestrough hanger bracket **2** supports the eavestrough **1** at front wall **4** side.

Debris guard **100** is laid over the eavestrough to cover the entire portion of the eavestrough extending beyond the roof edge. The mesh **180** faces up with the vertical debris supports **150** and **151** facing down received inside the eavestrough. The eavestrough fastening portion **160** rests on the top surface of the front flange **5** and the front mesh engagement structure or vertical debris guard support portion **151** is butted against the edge of the front flange **5** and its bottom end rests on top of the front end of eavestrough hanger bracket **2** adjacent the eavestrough **1** front flange **5**. Screws **162** are used to fasten the debris guard **100** to the eavestrough through slots or holes **161**. The rear mesh engagement structure or vertical debris guard support portion **150** bottom end rests on top of eavestrough hanger bracket **2** adjacent the building wall. Movement of the debris guard relative to the eavestrough is possible because mesh engagement structures or vertical debris guard supports **150**, **151** are not fixed to the eavestrough hanger eavestrough hanger brackets **2** and able to slide freely and slot **161** is shaped larger than the screw. When installed a gap remains between the buildings wall **8** and the rear flange or lip **170** at the back side **112** of the debris guard **100**. Debris guard is not attached to the building structure itself, only to the eavestrough to allow for expansion and contraction of the eavestrough relative to the building due to changes in temperature as well as to accommodate any flexing due environmental factors such as wind, expansion and contraction of water freezing and thawing in the eavestrough.

A mix of rainwater (r) and debris (d) runs off of roof edge **9** onto the debris guard **100**. The rear flange or lip **170** which in this embodiment is angled prevents debris and rain from flowing back towards the building wall **8**. Debris guard **100** when installed is inclined at roughly an angle of greater than 0 less than 90°, in this example it is roughly 10°, so that the frame back side **112** is higher than the frame front side **114**, the mesh engagement portions or vertical debris guard supports **150**, **151** which rest on the top surface of the eavestrough hanger eavestrough hanger bracket **2** set the height and slope of all of the debris guard **100**. The purpose of the inclination is to provide a continuous downward angle of the debris guard **100** to direct the rainwater (r) and debris (d) mix off of the roof forward towards the front side **114**, enhancing the washing of debris (d) off of the mesh **180**. As the rainwater (r) and debris (d) mix flows over the debris

guard **100**, the rainwater (r) flows through the mesh **110** to the water collection portion **120** of the frame. The water collection portion **120** has several slots or holes **121** which allow the rainwater (r) to pass through to the eavestrough. Debris (d) can be anything that falls onto the building roof or eavestrough, for example: pine needles, pinecones, leaves, and seed pods are prevented from passing through the mesh **180** and are shed off of the debris guard **100**.

FIGS. **18**A and **18**B show a bottom perspective view and a top perspective view, respectively, of an embodiment of an eavestrough debris cover **1800** having improved water flow-through. FIG. **18**C shows a top view of the debris cover **1800**. The debris cover **1800** may be adapted to be compatible with, or include at least some of the features of, water collection portions **120**, **420**, **1020**, and frame **510**. In other words, the debris cover **1800** may be adapted to have any number of cover configurations or shapes and be compatible with the embodiments described herein. Portions of the debris cover **1800** have been cut away in FIGS. **18**A, **18**B, and **18**C to provide clarity. The debris cover **1800** includes a plurality of holes, or slots, **1821**, a top surface **1822**, a bottom surface **1824** opposite the top surface **1822**, and a plurality of mesh supports **1830**. Only a subset of holes **1821** and mesh supports **1830** are labelled in FIGS. **18**A and **18**B to provide clarity. FIG. **18**D is a cross-sectional view of the water eavestrough debris cover **1800** taken along the line A-A in FIG. **18**C. FIG. **18**E is a magnification of a portion of FIG. **18**D.

The top surface **1822** may be seen as a water collection surface. In the present embodiment, the holes **1821** have an elongated shape, however, in other embodiments the holes **1821** may have other shapes. Each hole **1821** includes **18***a* drip leg **1826** that extends outward from the bottom surface **1824** with an extension distance **1832**. In the present embodiment, the holes **1821** are approximately rounded rectangles having two sides opposite one another along the long edges of the holes and two sides opposite one another along the short edges of the holes for a total of four edges. In alternate embodiments the holes may have a different number of edges or may be circular. The adhesive characteristics of water encourage rainwater to cling to the top surface **1822** and any other surfaces contiguous with the top surface **1822**, including the drip leg **1826**. Since the drip leg **1826** extends outward from the bottom surface **1824**, the force of gravity acting on the rainwater cooperates with the adhesive characteristics of the rainwater to draw rainwater down the drip leg **1826** and away from the top surface **1822**. Each drip leg **1826** may be coupled to each hole **1821** by a radiused edge that assists water that is flowing on the top surface of the eavestrough debris cover **1800** to flow downward through the hole such that there is an improved flow of water through the debris cover **1800**.

In other words, the eavestrough debris cover **1800** includes a plurality of drip legs **1826**. Only a subset of holes **1821** and drip legs **1826** are labelled in FIG. **18**C to provide clarity. Each hole **1821** has a width **1834** and is positioned a lateral distance **1836** from at least one rib feature **1830**.

Each drip leg **1826** is curved with a radius of curvature **1838**, although in alternative embodiments each drip leg may form an acute angle with a line parallel to top surface **1822** and bottom surface **1824** across each hole **1821**. In other words, each drip leg may be coupled to each hole via an acute or a radiused edge. Each drip leg **1826** has an edge thickness **1840** that may be equal to or different from an extrusion thickness **1842**. In other words, each drip leg **1826** may have an edge thickness **1840** thinner than the extrusion thickness **1842** of the eavestrough debris cover **1800**, which may include an extrusion thickness of a frame. The drip legs **1826** extend at an angle of approximately 90 degrees as shown in FIGS. **18**A-**18**E, however a skilled person having the benefit of the present disclosure will appreciate that the drip legs may extend at an angle other than 90 degrees, for example less than 90 degrees, and still provide improved flow-through. The increased slot extension radius aids in drawing water into the slot or hole. Increased extension distance prevents water from or reduces the likelihood of water clinging and moving along the underside of the cover ensuring water drops down into the eavestrough.

In use, rainwater may make its way onto top surface **1822** and may accumulate near the plurality of holes **1821**. Rainwater may move past the plurality of holes **1821** in cases where the debris cover **1800** is constructed with a slope or installed on a sloped eavestrough or gutter. Rainwater may be drawn down the drip leg **1826** by both the action of the adhesive characteristics of water and by the force of gravity. Gravity then causes rainwater to drop off the bottom of the drip leg **1826**. Rainwater may run along side the bottom of the drip leg **1826** until it reaches an end of the drip leg **1826** and has nowhere else to travel at which point it drops into the eavestrough or gutter. The curvature and extension below the bottom surface **1824** of the drip legs **1826** may thereby provide for enhanced water flow through the eavestrough debris cover **1800** by directing water to the drip legs **1826** from which water may more quickly easily fall into the gutter. In other words, the drip legs **1826** provide the eavestrough debris cover **1800** with improved water flow-through relative to water collection portions lacking drip legs. The drip legs **1826** shown in FIGS. **18**A-E extend around all of the edges of the holes **1821**, however in alternative embodiments the drip legs may extend around fewer than all of the edges of the holes.

FIG. **19**A shows a top view of another embodiment of an eavestrough debris cover **1900** having improved water flow-through. FIG. **19**B shows a cross-sectional view of the debris cover **1900** along line D-D from FIG. **19**A. FIG. **19**C shows a cross-sectional view of the debris cover **1900** along line F-F from FIG. **19**A. FIG. **19**D shows a top perspective view of the debris cover **1900**, with a portion shown in magnification. FIG. **19**E shows a bottom perspective view of the debris cover **1900**, with a portion shown in magnification. Portions of the debris cover **1900** have been cut away in FIGS. **19**A, **19**D, and **19**E to provide clarity.

The debris cover **1900** includes a plurality of holes **1921**, a top surface **1922**, a bottom surface **1924** opposite the top surface **1922**, and a plurality of mesh supports **1930**. Each hole **1921** includes a drip leg **1926** that extends outward from the bottom surface **1924**. Only a subset of holes **1921**, drip legs **1926**, and mesh supports **1930** are labelled in FIGS. **19**A to **19**E to provide clarity. The debris cover **1900** is similar to the debris cover **1800**, however the drip legs **1926** extend from only three sides of the holes **1921**, as shown in the magnification of FIG. **19**E.

FIG. **20**A shows a top view of another embodiment of an eavestrough debris cover **2000** having improved water flow-through. FIG. **20**B shows a cross-sectional view of the debris cover **2000** along line D-D from FIG. **20**A. FIG. **20**C shows a cross-sectional view of the debris cover **2000** along line F-F from FIG. **20**A. FIG. **20**D shows a top perspective view of the debris cover **2000**, with a portion shown in magnification. FIG. **20**E shows a bottom perspective view of the debris cover **2000**, with a portion shown in magnification.

Portions of the debris cover **2000** have been cut away in FIGS. **20**A, **20**D, and **20**E to provide clarity. The debris

cover **2000** includes a plurality of holes **2021**, a top surface **2022**, a bottom surface **2024** opposite the top surface **2022**, and a plurality of mesh supports **2030**. Each hole **2021** includes a drip leg **2026** that extends outward from the bottom surface **2024**. Only a subset of holes **2021**, drip legs **2026**, and mesh supports **2030** are labelled in FIGS. **20**A to **20**E to provide clarity. The debris cover **2000** is similar to the debris cover **1800** and debris cover **1900**, however the drip legs **2026** extend from only one side of the holes **2021**, as shown in the magnification of FIG. **20**E.

It is understood that while three different embodiments showing 1, 3 and 4 drip legs are shown, another embodiment may include two drip legs. In other words, each of the plurality of drip legs may be coupled to one, two, three, or four out of four sides of each of the plurality of holes. Furthermore, while the drip legs are shown as extending an entire length of a side of the hole, the drip legs may also extend only a portion of the length. It is understood that while embodiments are shown with holes having an elongated shape and rounded edges, other embodiments may have holes with other shapes, for example circular or square shapes. For circular holes, the drip legs may be connected to a portion of a perimeter of the hole such as along an arc or a semi-circular part of the hole.

While various embodiments have been described above, it should be understood that they have been presented only as illustrations and examples of the present disclosure, and not by way of limitation. It will be apparent to persons skilled in the relevant art that various changes in form and detail can be made therein without departing from the spirit and scope of the disclosure. Thus, the breadth and scope of the present disclosure should not be limited by any of the above-described exemplary embodiments but should be defined only in accordance with the appended claims and their equivalents. It will also be understood that each feature of each embodiment discussed herein, and of each reference cited herein, can be used in combination with the features of any other embodiment. All patents and publications discussed herein are incorporated by reference herein in their entirety.

What is claimed:

1. A debris guard for installation on an eavestrough comprising:

a frame portion including a back side, a front side, and two ends connecting the back side to the front side; and

a water collection portion, mounted to the frame portion, defined by the front side, the back side and the two ends, the water collection portion including a top surface:

a plurality of holes to allow rainwater to pass through; and

a plurality of drip legs coupled to and curved with respect to the plurality of holes and defining a size and location of the holes, the plurality of drip legs extending downwards to provide improved water flow through the eavestrough debris guard, wherein each of the plurality of holes includes at least two drip legs;

wherein the at least two drip legs are coupled to the plurality of holes via radiused edges and are positioned 90° with respect to the top surface.

2. The debris guard of claim **1** wherein each of the plurality of drip legs is coupled to one of four sides of each of the plurality of holes.

3. The debris guard according to claim **2** wherein each of the plurality of drip legs extends along a portion of the one of the four sides.

4. The debris guard according to claim **1** wherein each of the plurality of drip legs has an edge thickness thinner than an extrusion thickness of the frame.

5. The debris guard according to claim **1** wherein the plurality of drip legs extend below the bottom surface at an angle of less than or equal to 90 degrees.

6. The debris guard according to claim **1** wherein the plurality of holes have an elongated shape.

7. The debris guard according to claim **1**, wherein the plurality of holes allow water to pass through to the eavestrough.

8. The debris guard according to claim **1**, further comprising a mesh fastened to the frame and positioned to cover the water collection portion.

9. The debris guard of claim **8**, wherein the frame further comprises a plurality of mesh supports extending from the top surface.

10. The debris guard of claim **1**, wherein the frame further comprises a connector engagement structure extending outward from the water collection portion.

11. The debris guard according to claim **10** wherein the connector engagement structure extends along the length of the frame.

12. The debris guard according to claim **10**, wherein the connector engagement structure extends outward from a bottom surface of the water collection portion.

13. The debris guard according to claim **10**, wherein the connector engagement structure is a pair of connector engagement structures spaced apart.

14. The debris guard according to claim **13**, further comprising a connector, wherein the pair of connector engagement structures and one of the top surface or the bottom surface form a connector receiving opening on each end of the frame that is shaped to receive the connector.

15. The debris guard according to claim **14**, wherein the connector has a fastener portion and the connector receiving opening is shaped to receive the fastener portion of the connector in a snug slide fit.

16. The debris guard according to claim **15**, wherein the connector has a central portion with fastener portions spaced apart and extending outwardly from each side of the central portion.

17. The debris guard according to claim **16**, wherein the connector further comprises a joint covering portion along a length of the central portion for covering ends of lengths or pieces of the frame when joined to each other.

* * * * *