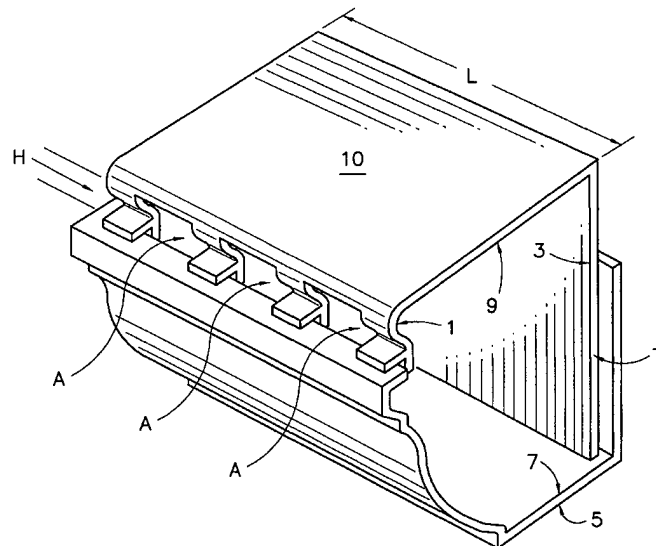




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(54) Title: GUTTER PROTECTOR



(57) Abstract

A gutter protector (10) for preventing leaves and other debris from entering into a standard gutter (5) that fits independently into the gutter (5) without fasteners such as nails or screws or any attachment to the roof, fascia, or any other part of a building. The gutter protector (10) includes an inner wall (3) which fits against the rear wall (11) of the gutter (5) while seated upon the bottom wall (7) of the gutter (5) and a curved section (1) that allows water to flow over the flat section (9) of the gutter protector (10) through a uniform space (A) between the gutter protector (10) and the gutter (5) created by a clip (13) in the gutter protector (10) that attaches to the gutter (5). The uniform space (A) does not allow leaves or other debris larger than the uniform space (A) to enter the gutter (5) but maintains a space (A) for a constant flow of water into the gutter (5).

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GUTTER PROTECTOR

Field of the Invention

5 This invention relates to a gutter protector. In particular, this invention relates to a gutter protector that fits into standard gutters without fasteners such as nails or screws and deflects debris away from gutters while permitting water to flow into the gutters.

Background of the Invention

10 Traditional gutters trap and accumulate debris from trees, animals and other sources. Accumulated debris severely reduces the ability of gutters to properly transfer water from the roof of a structure to locations away from the foundation of the structure, thereby defeating the fundamental purpose of gutters. Accordingly, debris accumulation in gutters necessitates periodic maintenance to
15 remove debris and return gutters to operational condition.

Various attempts have been made to alleviate debris accumulation in gutters. Each attempt, however, has provided either expensive, impractical designs or fails to provide systems easily and securely integrated into standard, existing gutters.

20 None of the patents that follow are for gutter covers or protectors that fit independently into standard gutter without attachment to the roof or structure and either fail to propose a gutter protector capable of maintaining a uniform space between the gutter protector and standard gutter, or propose expensive, complicated, or impractical spacing methods: U.S. Patent No. 4,404,775; U.S.
25 Patent No. 4,435,925; U.S. Patent No. 4,497,146; U.S. Patent No. 4,796,390; U.S. Patent No. 5,181,350; U.S. Patent No. 5,375,379; and U.S. Patent No. 5,459,965. For example, the device proposed in the '775 patent either provides no manner for maintaining a constant water flow passage between the device and gutter, or requires a separate, complicated support bracket. Similarly, none of the
30 devices in the '181, '375 or '459 patents allow for a constant water flow into the gutter.

The following patents fail to propose a gutter protector capable of adequately protecting the gutter from debris accumulation and/or required fasteners such as nails or screws to attach the gutter protector to the roof, fascia
35 or other part of the structure to maintain the protective cover in place above the gutter and to provide a constant flow of water into the gutter: U.S. Patent No. 546,042; U.S. Patent No. 836,012; U.S. Patent No. 891,405; U.S. Patent No.

2,672,832; U.S. Patent No. 4,455,791; U.S. Patent No. 4,604,837; and U.S. Patent No. 5,406,755. For example, the device proposed in the '042 patent traps debris where the shield meets the gutter, thereby preventing water flow into the gutter. Of the above patents, the following require fasteners for attachment of the gutter protector to the roof, fascia or other portion of the structure to maintain the protective cover of the gutter protector above the gutter and to provide a constant flow of water into the gutter: '925, '837 and '755. Therefore, there is a great and thus unsatisfied demand for an inexpensive, uncomplicated and effective gutter protector for use with standard gutters.

Summary of the Invention

This invention provides a one-piece gutter protector which deflects debris away from the gutter while permitting water to flow into the gutter and fits independently into standard gutters without fasteners such as nails or screws for attachment to the roof, fascia or any other part of the structure. The gutter protector fits into a standard gutter and includes an inner wall and contacts at least a portion of the rear wall of a standard gutter. The lower edge of the inner wall contacts the bottom wall of the gutter and a curved portion that extends to and above the lip of the gutter clips onto the lip and deflects debris away from the gutter but allows water to flow into the gutter.

The shape of the gutter protector maintains a constant and adequate path for water to flow from the roof into the gutter. A clip formed as part of the curved portion of the gutter protector enables the gutter protector to rest upon and be supported by a standard gutter and maintain a constant path for water to flow to the interior of the gutter independently without the need for separate and complicated brackets or fasteners such as nails or screws that are attached to the roof, fascia or any part of the structure. The inner wall of the gutter protector fits against at least a portion of the rear wall of the gutter while contacting the bottom wall of the gutter and does not require attachment to the fascia, roof or structure to maintain the protective cover over the gutter while allowing a constant flow of water into the gutter.

Brief Description of the Drawings

Fig. 1 is a cross-sectional view of a gutter protector according to the invention shown positioned in a standard "K" gutter.

Figs. 2 & 2A show front views of clips which fit onto the outer edge or lip of a standard gutter and provide an opening for water to flow into the gutter.

Fig. 3 is a side view of the gutter protector shown in Fig. 1.

Fig. 4 and 4A are perspective views of gutter protectors shown in Figs. 2 and 2A, respectively, positioned in a standard "K" gutter.

Fig. 5 is a cross-sectional view of another embodiment of a gutter protector according to the invention shown positioned in a standard half-round gutter.

Fig. 6 is a cross-sectional view of still another embodiment of a gutter protector according to the invention shown positioned in a standard half-round gutter.

Detailed description of the Invention

The following description is intended to refer to the specific embodiment illustrated in the drawings. This description is not intended to define or limit the scope of the invention which is defined separately in the claims that follow.

Referring to Fig. 1, the numeral "10" designates an embodiment of the gutter protector according to this invention. Gutter protector 10 is shown seated in the gutter designated by the numeral "5." Gutter 5 is a standard "K" gutter trough commonly known and used in the commercial and residential building industry. Gutter 5 has an interior space designated "12," and is defined by a rear wall 11, an outer wall 6 which extends to lip 8 and a bottom wall 7 connecting rear wall 11 to outer wall 6.

Details of gutter protector 10 are described with reference to Figs. 1, 2, 2A, 3, 4 and 4A below:

Fig. 1 illustrates an important feature of the invention wherein a curved portion 1 of gutter protector 10 extends up to and above lip 8 curving toward the interior of the gutter and its final outward curve back toward lip 8 ending as clip 13 which attaches to lip 8. Curved portion 1 allows water to flow over the gutter protector into gutter 5. This feature eliminates possible grooves, troughs, creases or channels between gutter protector 10 and the gutter where debris can collect. Space A is created above lip 8 of gutter 5 by clip 13, which is the lower portion of curved portion 1. Clip 13 attaches to lip 8 and secures gutter protector 10 into position above lip 8 and maintains space A through which water flows into the interior of gutter 5.

Alternatively, clip 13 may be formed along the lower longitudinally extending edge of curved portion 1 as illustrated in Figure 4A. The smooth surface of flat portion 9 as shown in Fig. 3 maintains the flow of water from inner wall 3 to curved portion 1. The outermost extent of curved portion 1 over gutter

5 coincides with the inner edge of lip 8 at dashed line B as shown in Fig. 1 so that water following the contour of curved portion 1 flows into gutter 5. However, debris such as leaves and tree branches larger than space A is deflected away from gutter 5 because that debris cannot physically pass through space A into gutter 5. Debris small enough to travel with water through said space A passes harmlessly with the water into the gutter and through the entire roof drainage system. Space A created by the curvature of curved portion 1 allows water flowing along flat portion 9 to contour and fall over curved portion 1 of gutter protector 10 into gutter 5.

Figures 2 & 2A are alternate front views illustrating two variations of curved portion 1 of gutter protector 10 which depict space A and clip 13. Utilization of either variation depends upon the manufacturer's preference. If plastic is used to form gutter protector 10, gutter protector 10 will easily be strong enough to support the weight of the environmental elements such as snow, ice and rain.

Fig. 3 shows gutter protector 10 from the side, illustrating its important contour. Specifically, Figure 3 shows inner wall 3 of gutter protector 10 and its slightly greater than 90 degree angle to flat portion 9 which proceeds laterally to and above the gutter becoming curved portion 1 which curves toward the interior of the gutter and then curves outwardly forming clip 13. The angle where inner wall 3 meets flat portion 9 is slightly greater than 90 degrees in order to create tension between the points of contact of gutter protector 10 with gutter 5 at bottom wall 7 and lip 8.

Referring to Fig. 4, gutter protector 10 has an overall length L which preferably corresponds to the length of gutter 5 in which gutter protector 10 independently fits. The upper portion of inner wall 3 angles and extends laterally as flat portion 9 toward curved portion 1. Gutter protector 10 has a thickness of T sufficient to provide a rigid surface capable of withstanding environmental elements such as wind, ice and snow. Curved portion 1 creates height H forming space A through which water may continuously flow into the gutter. Flat portion 9 and curved portion 1 of gutter protector 10 most preferably have a smooth surface.

Figure 4A is an alternative view illustrating a variation of curved portion 1 where clip 13 is formed at its lower longitudinally extending edge with space A created through cutouts in curved portion 1. Figure 4A also illustrates the inner

curve of curved portion 1 toward the interior of gutter 5, its outward curve toward lip 8 and the contact of clip 13 with lip 8 of gutter 5 which provides strength and stability.

5 Gutter protector 10 is preferably formed from malleable materials such as plastic, fiberglass, composite material or other suitable ultraviolet resistant materials, depending upon the manufacturer's preference. PVC is especially preferred. However, gutter protector 10 is optionally formed from aluminum, copper, stainless steel, alloys or other metallic materials commonly used in building gutter systems.

10 Installation and operation of gutter protector 10 will now be described with reference to Figs. 1-4A. As one contiguous piece, gutter protector 10 fits independently into standard gutters without fasteners for attachment to the fascia, roof or any other part of the structure. Alternately, inner wall 3 may fit against any portion of rear wall 11 or may not contact rear wall 11 at all. However, the
15 lower longitudinally extending edge of inner wall 3 must contact bottom wall 7 of gutter 5. Two parts of gutter protector 10 contact gutter 5: (1) inner wall 3 contacts at least a portion of rear wall 11 of gutter 5 while contacting bottom wall 7 of gutter 5 and (2) clip 13 of curved portion 1 contacts lip 8 of gutter 5. Gutter protector 10 is held in place by the force of gravity on the two contact points as
20 well as the tension between inner wall 3 and contact with at least a portion of rear wall 11 and its contact with bottom wall 7 and the attachment of clip 13 to lip 8 of gutter 5. These two contact points provide a strong and stable union with the gutter that is stationary and easily capable of withstanding the environmental elements of wind, rain, snow and ice.

25 Leaves and other debris washed by water from the roof onto gutter protector 10 seated independently in gutter 5 as illustrated in Figs. 1 & 4 are deflected away from lip 8 because of the limitations of space A created by the comparatively low height H. Water continuously flows over curved portion 1 of gutter protector 10 through space A created by height H into gutter 5; however,
30 leaf fragments and debris larger than space A are deflected away from gutter 5. The following Example exemplifies the operation of a gutter protector according to this invention:

EXAMPLE

35 A gutter protector according to this invention was formed from Polyvinyl Chloride or PVC having a thickness of .085

centimeters and length of 48 inches. An inner wall fitting against at least a portion of the rear wall of a standard gutter measured $4\frac{3}{4}$ inches and was seated upon the bottom wall of a standard gutter. Flat portion 9 proceeded laterally from the upper portion of the inner wall to curved portion 1 and had an approximate length of 5 inches. Curved portion 1 had a diameter of approximately $\frac{1}{2}$ inch and its outward curve had a diameter of $\frac{1}{2}$ inch with clip 13 attached to lip 8.

The gutter protector was inserted into standard "K" gutter of a roof and tap water from a hose was supplied to the roof at progressively greater flow rates of 30 gallons per hour, 45 gallons per hour, 60 gallons per hour, 90 gallons per hour and 120 gallons per hour. These flow rates represent the flow of rainwater over the four foot length of the gutter protector. Even at the highest rate of 120 gallons per hour per four foot section of gutter protector, simulated rainwater followed the contour of curved portion 1 and flowed into the gutter. This indicates that rainwater, even during severe thunderstorms, will follow the contour of the gutter protector and flow through the space designated space A created by height H of curved portion 1 into the gutter while debris larger than $\frac{3}{8}$ inch is deflected away from the gutter.

If desired, changes and modifications can be made to the illustrated embodiment of this invention without departing from its spirit and scope. For example, clip 13 may contact lip 8 longitudinally with water flowing into the gutter through openings in the outermost curve of curved portion 1 formed at regular intervals as illustrated in Figure 2A. Gutter protector 10 may be manufactured with varied dimensions of thickness and height above the gutter, so long as space is provided for water to flow into the gutter.

Fig. 5 shows another embodiment of a gutter protector in accordance with aspects of the invention. The gutter protector 20 in Fig. 5 is similar to and performs the same function as gutter protector 10, previously described. It is different in certain aspects in order to fit into another type of standard gutter 22 typically known as a "half-round" gutter. Such half-round gutters are of an older design and do not contain the discrete sidewalls 5, 6 and 11 as shown in

the K gutters of Fig. 1. Lower portion 24 of gutter protector 20 engages inner surface 26 of gutter 22 at a location approximate the side 29 where gutter 22 connects to or is mounted to the outer fascia of a structure. The exact point where lower portion 24 engages inner surface 26 is not particularly important so long as the sloped portion 28 of gutter protector 20 maintains a "downhill" slope proceeding from the left to right as shown in Fig. 5.

Another difference of gutter protector 20 as shown in Fig. 5 from gutter protector 10 shown in Fig. 1 is that the clip 13 of gutter protector 10 has been changed to fit rounded gutter 22. Particularly, clip 30 of gutter protector 20 is sized and shaped to engage lip 32 of gutter 22. Clip 30 simply surrounds and snaps over and around lip 32.

Fig. 6 shows another embodiment of a gutter protector in accordance with aspects of the invention. Gutter protector 20 in Fig. 6 is similar to that shown in Fig. 5 except that lower portion 24 from Fig. 5 has been supplemented with a forked groove 27 that engages the upper edge of side 29. The remaining structural portions of gutter protector 20 are the same as that shown in Fig. 5.

Other aspects of the structure and operation of gutter protector 20 from Figs. 5 and 6 remain the same as gutter protector 10. Thus, water flows from the roof of the structure onto sloped portion 28, travels over curved portion 34 and flows downwardly through a space (not shown) similar to space A in Figs. 1, 2, 2A, 4 and 4A. Of course, leaves, debris and the like do not enter the interior portion 36 of gutter 22.

The present invention, in any embodiment, provides an inexpensive device for reliably preventing debris accumulation in standard gutters. The invention is inexpensive to manufacture, simple to install, and dependable in use. Because of its unique one-piece construction and its independent fit into standard gutter systems without the need for fasteners of any kind for attachment to the fascia, roof or any other part of the structure, installation is accomplished by simply inserting the gutter protector directly into standard gutter with clip 13 attaching lip 8 and inner wall 3 seated upon bottom wall 7 of gutter 5.

What is claimed is:

1. A gutter protector that fits independently into a gutter without fasteners and is adapted to prevent debris from entering a gutter and permit flow of water from a roof of a building into said gutter, said gutter having an interior defined by an inner wall portion and an outer wall portion having an upper lip comprising:

5 an inner wall having a lower edge adapted to fit against at least a portion of the inner wall portion of said gutter;

10 a substantially flat portion extending laterally from an upper edge of said inner wall and adapted to receive said water flowing from said roof and being sloped to transfer said water away from said roof and into said gutter;

a curved portion extending downwardly from said flat portion to and above said upper lip and curving toward said interior to receive water from said flat portion and transfer said water to said interior; and

15 a clip projecting from said curved portion and being shaped to attach onto said upper lip to provide support for said curved portion and to define a space above said gutter for water to flow from said curved portion into said interior.

2. A gutter protector comprising:

a longitudinally extending inner wall having a lower edge that fits against at least a portion of an inner wall portion of a gutter;

5 a substantially sloped portion extending from an upper edge of said inner wall portion to and above a lip extending from an outer wall portion of said gutter;

a curved portion extending from said sloped portion to and above said lip and curving toward an interior of said gutter; and

10 a clip projecting from said curved portion, said clip being located substantially transverse to the length of said gutter protector and shaped to attach to said lip to provide support for said curved portion and to define a space above said gutter for water to flow from said curved portion into said gutter.

3. The gutter protector described in Claim 2, wherein following its inward curve toward the interior of said gutter, the lower longitudinally extending edge of said curved portion curves outwardly to and clips onto said lip of said gutter allowing water to flow into said gutter through openings placed at regular intervals in said outward curve of said curved portion.

4. A gutter protector that fits independently into a gutter without fasteners and is adapted to prevent debris from a roof of a building from entering a gutter and permit flow of water from said roof of said building into said gutter, said gutter having an interior defined by an inner wall, a rear wall, said gutter protector and an outer wall having an upper lip, and a bottom wall connecting said inner wall to said outer wall comprising:

an inner wall adapted to fit against at least a portion of the rear wall of said gutter and having a lower edge positioned on said bottom wall;

a flat portion extending laterally from an upper edge of said inner wall and adapted to receive said water flowing from said roof and being sloped horizontally to transfer said water away from said roof and into said gutter;

a curved portion extending downwardly from said flat portion to and above said upper lip and curving toward said interior to receive water from said flat portion and transfer said water to said interior; and

a clip projecting from said curved portion and being shaped to attach onto said upper lip to provide support for said curved portion and to define a space above said gutter for water to flow from said curved portion into said interior.

5. A gutter protector comprising:

a longitudinally extending inner wall that fits against at least a portion of a rear wall of a gutter and having a lower edge seated upon a bottom wall of said gutter;

5 a sloped portion extending from an upper edge of said inner wall to and above a lip extending from an outer wall of said gutter;

a curved portion extending from said sloped portion to and above said lip and curving toward an interior of said gutter; and

10 a clip projecting from said curved portion, said clip being located substantially transverse to the length of said gutter protector and shaped to attach to said lip to provide support for said curved portion and to define a space above said gutter for water to flow from said curved portion into said gutter.

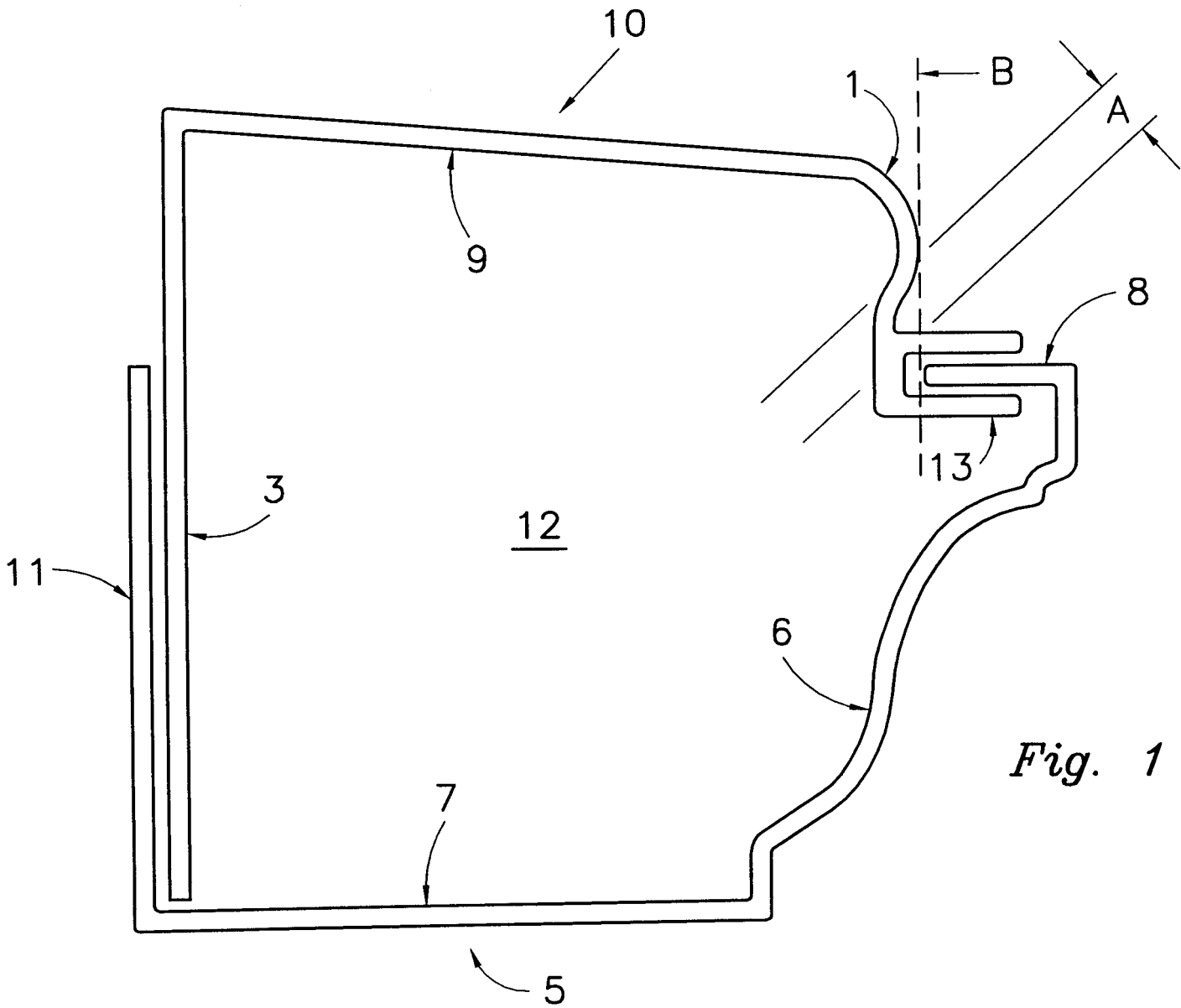


Fig. 1

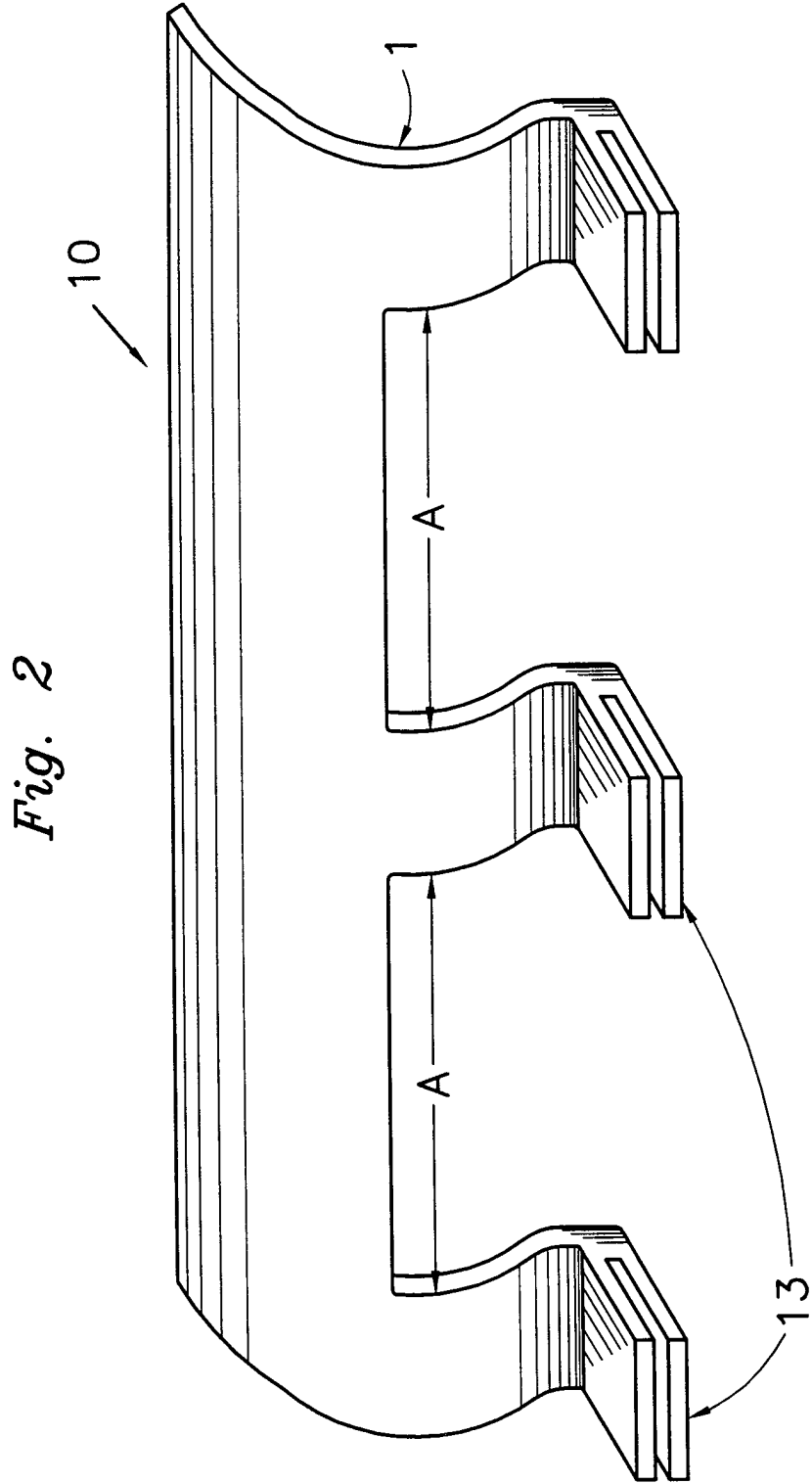
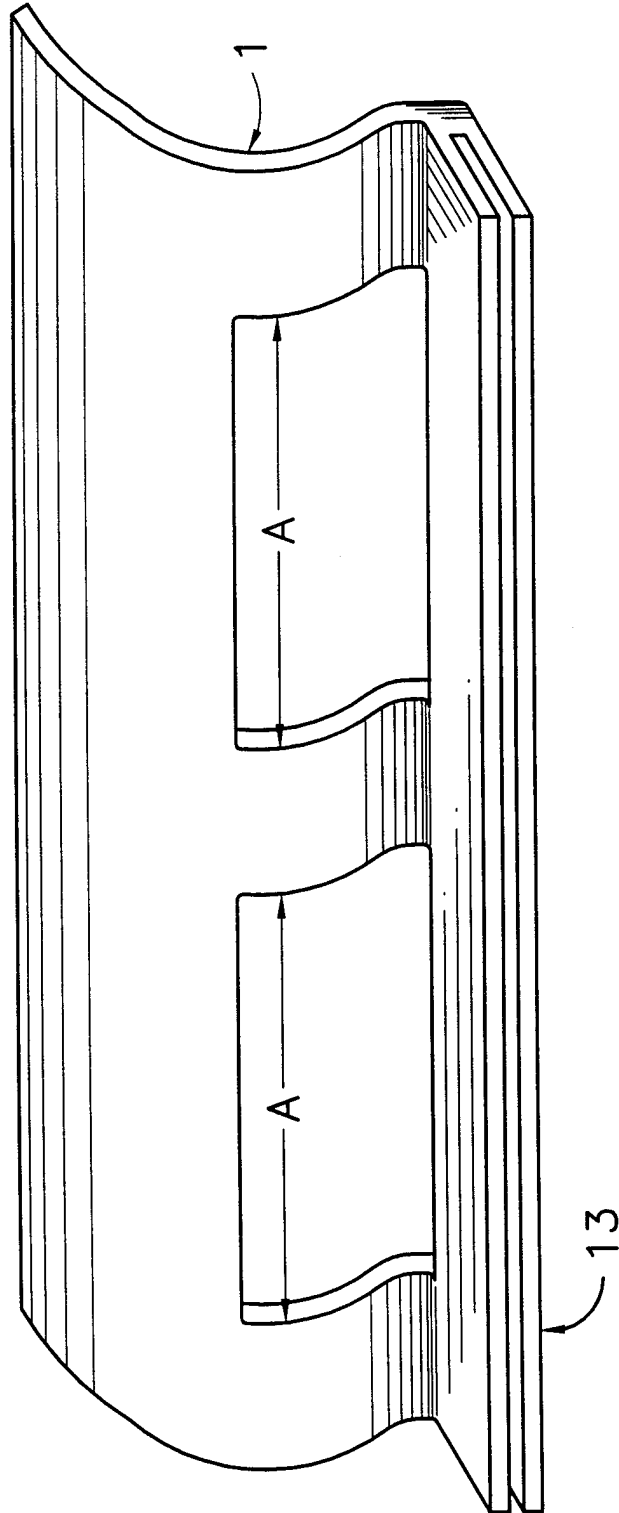


Fig. 2

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Fig. 2A

10



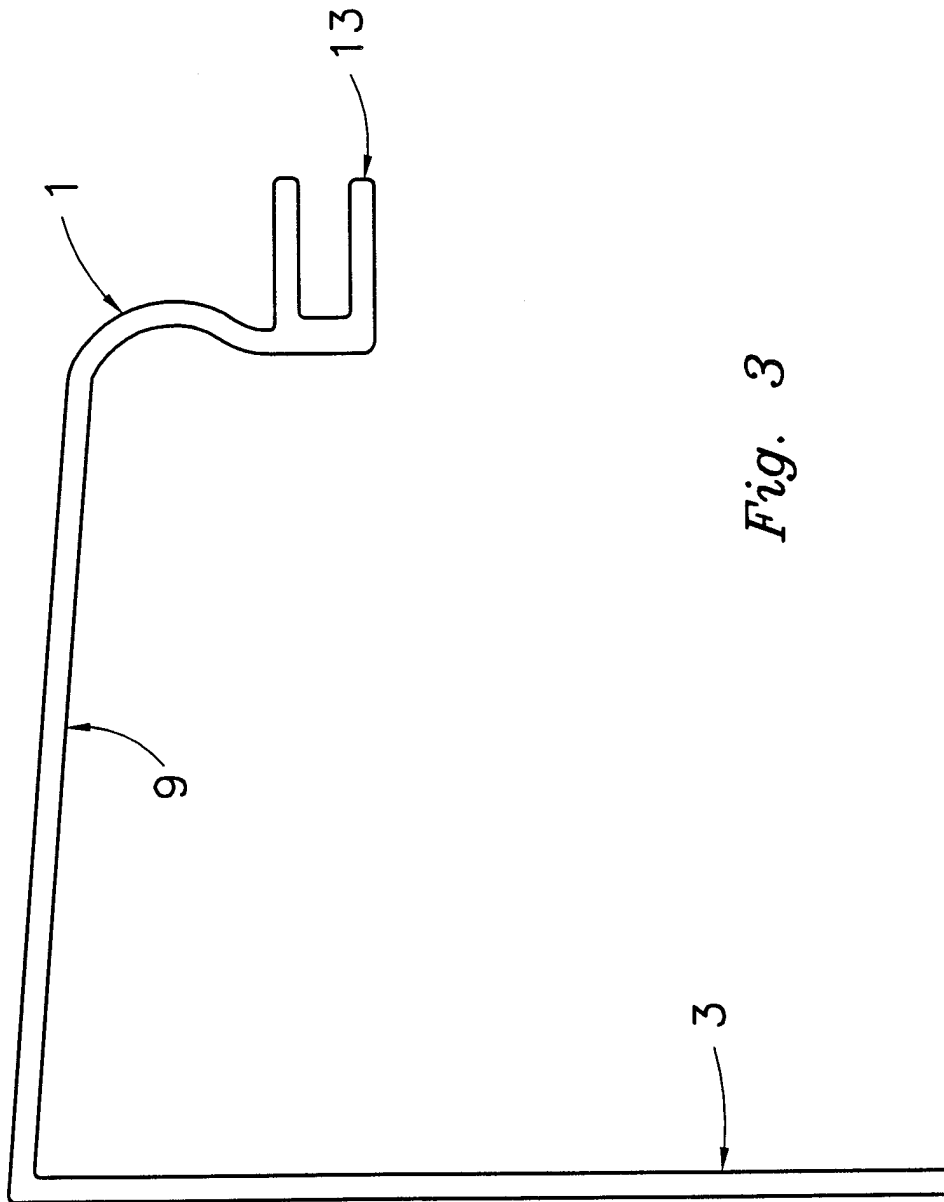
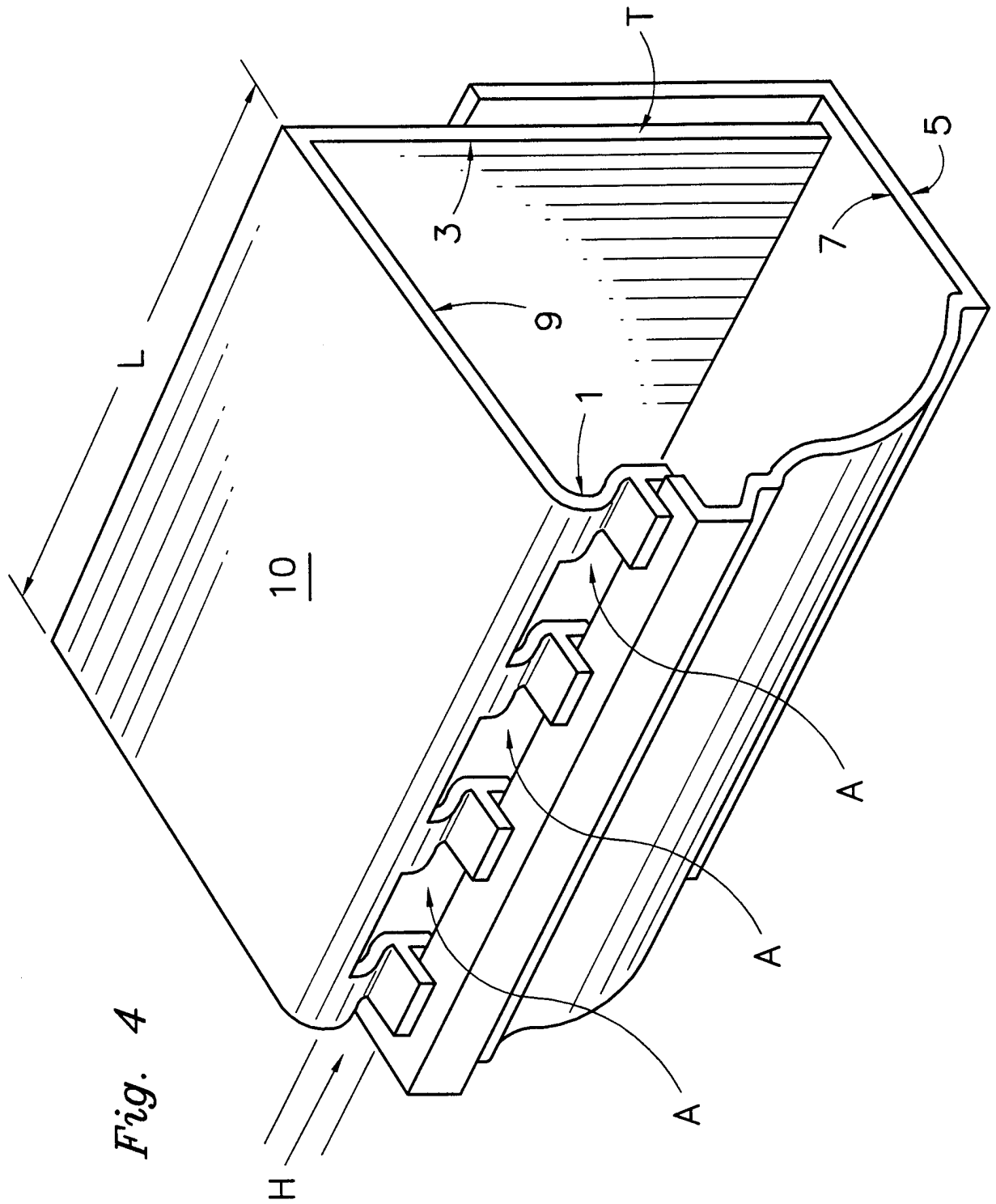


Fig. 3



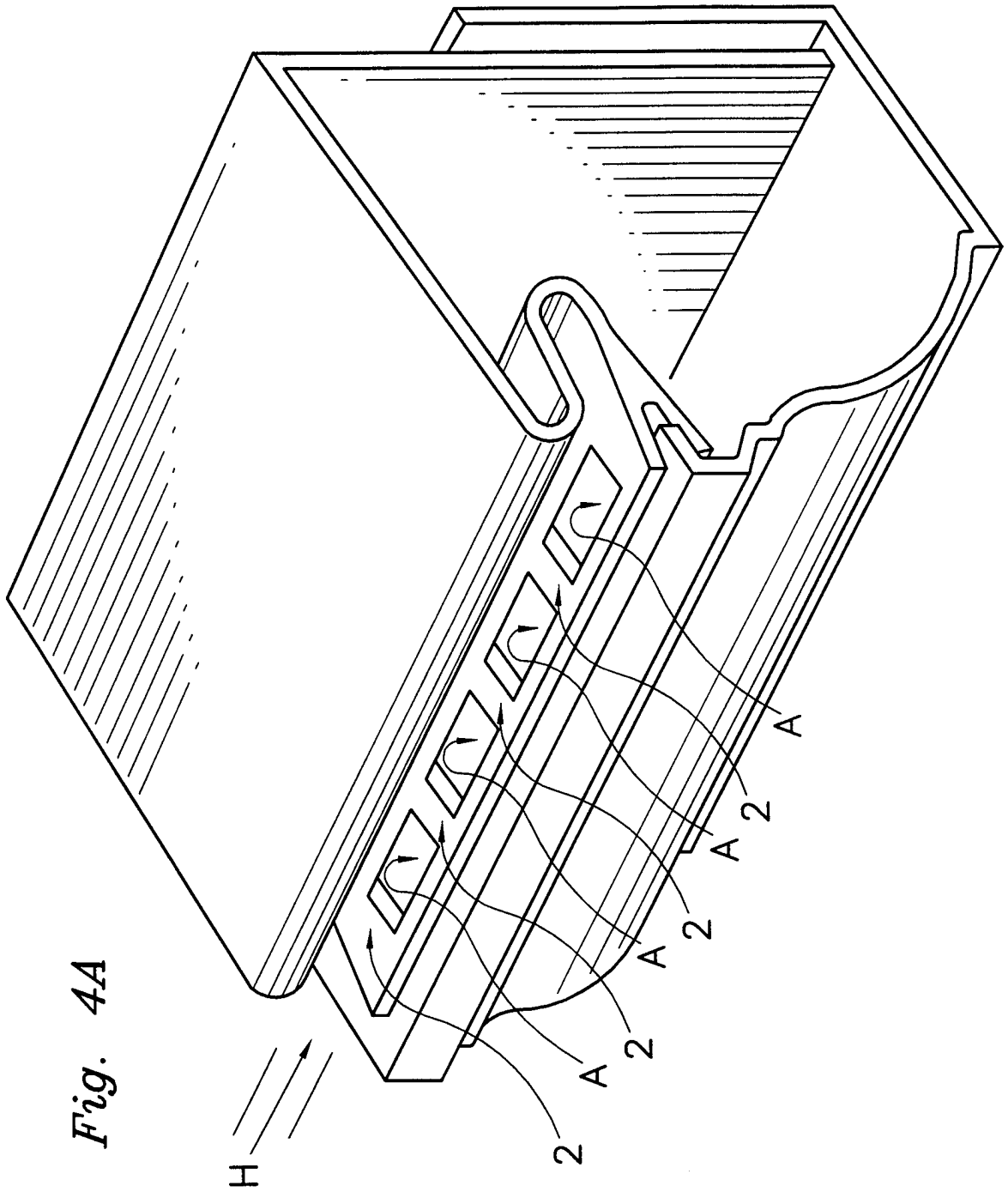


Fig. 4A

Fig. 5

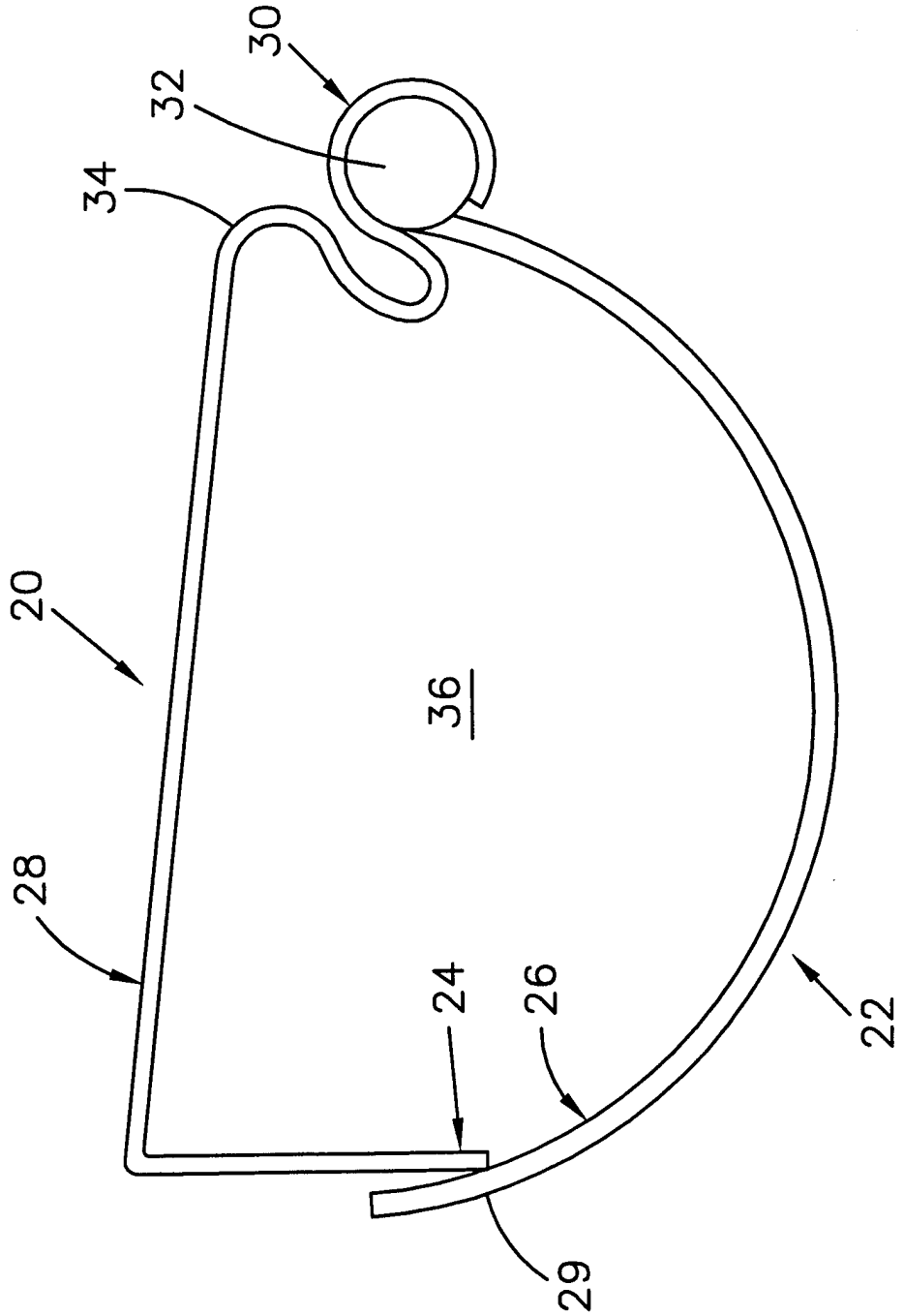
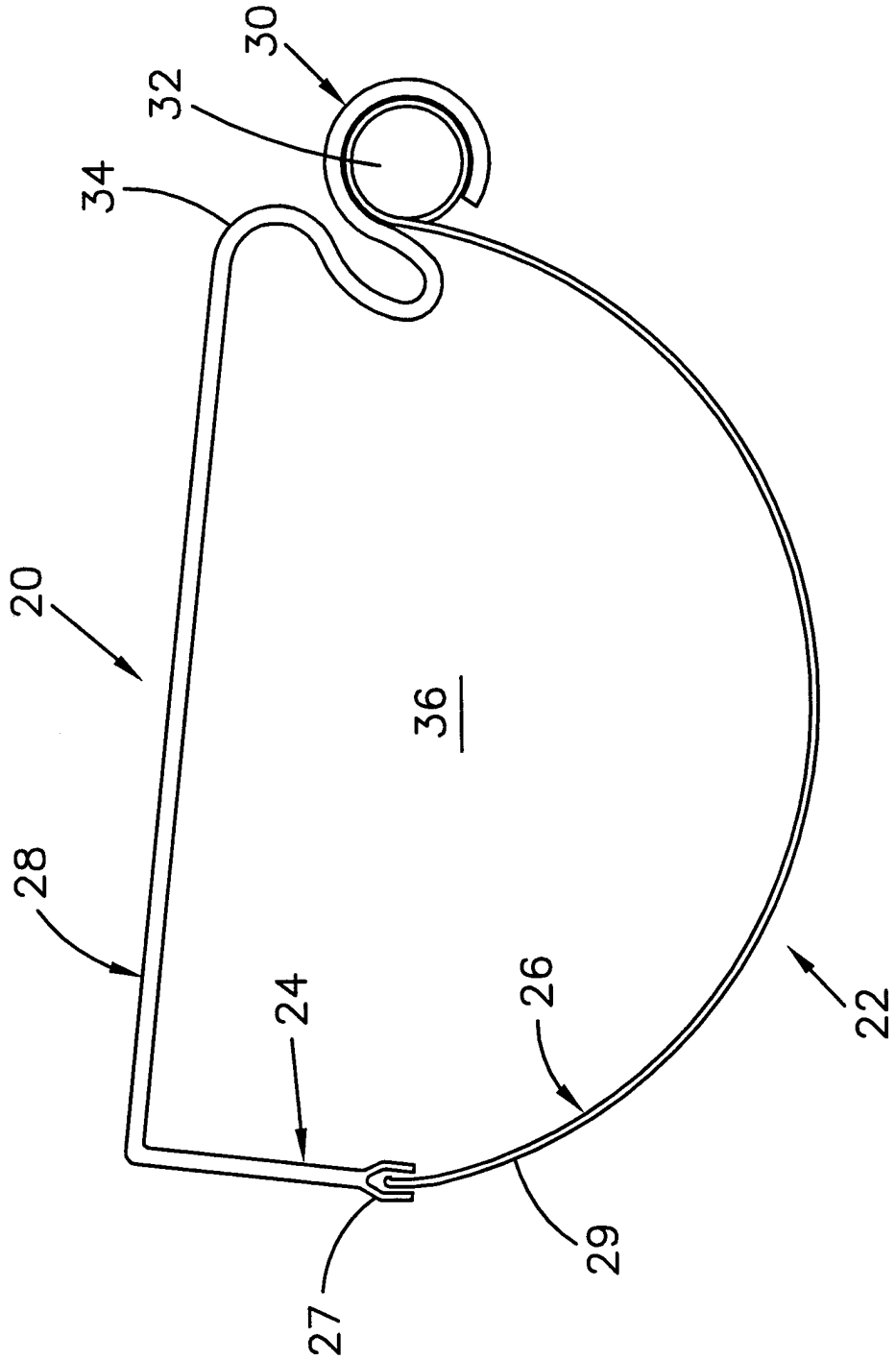


Fig. 6



INTERNATIONAL SEARCH REPORT

International application No.
PCT/US98/07013

A. CLASSIFICATION OF SUBJECT MATTER
 IPC(6) :E04D 13/076
 US CL :52/12
 According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
 Minimum documentation searched (classification system followed by classification symbols)
 U.S. : 52/11, 12

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 3,507,396 A (HOMA) 21 APRIL 1970 (21/04/70), SEE ENTIRE DOCUMENT.	1-5
A	US 4,592,174 A (HILEMAN) 03 JUNE 1986 (03/06/86), SEE ENTIRE DOCUMENT.	1-5
A	US 4,607,465 A (HOPKINS) 26 AUGUST 1986 (26/08/86), SEE ENTIRE DOCUMENT.	1-5
A	US 4,888,920 A (MARULIC) 26 DECEMBER 1989 (26/12/89), SEE ENTIRE DOCUMENT.	1-5
A	US 4,905,427 A (McPHALEN) 06 MARCH 1990 (06/03/90), SEE ENTIRE DOCUMENT.	1-5
A	US 5,522,183 A (ALLEN) 04 JUNE 1996 (04/06/96), SEE ENTIRE DOCUMENT.	1-5

Further documents are listed in the continuation of Box C. See patent family annex.

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Date of the actual completion of the international search 26 MAY 1998	Date of mailing of the international search report 23 JUN 1998
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US98/07013

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5,595,027 A (VAIL) 21 JANUARY 1997 (21/01/97), SEE ENTIRE DOCUMENT.	1-5