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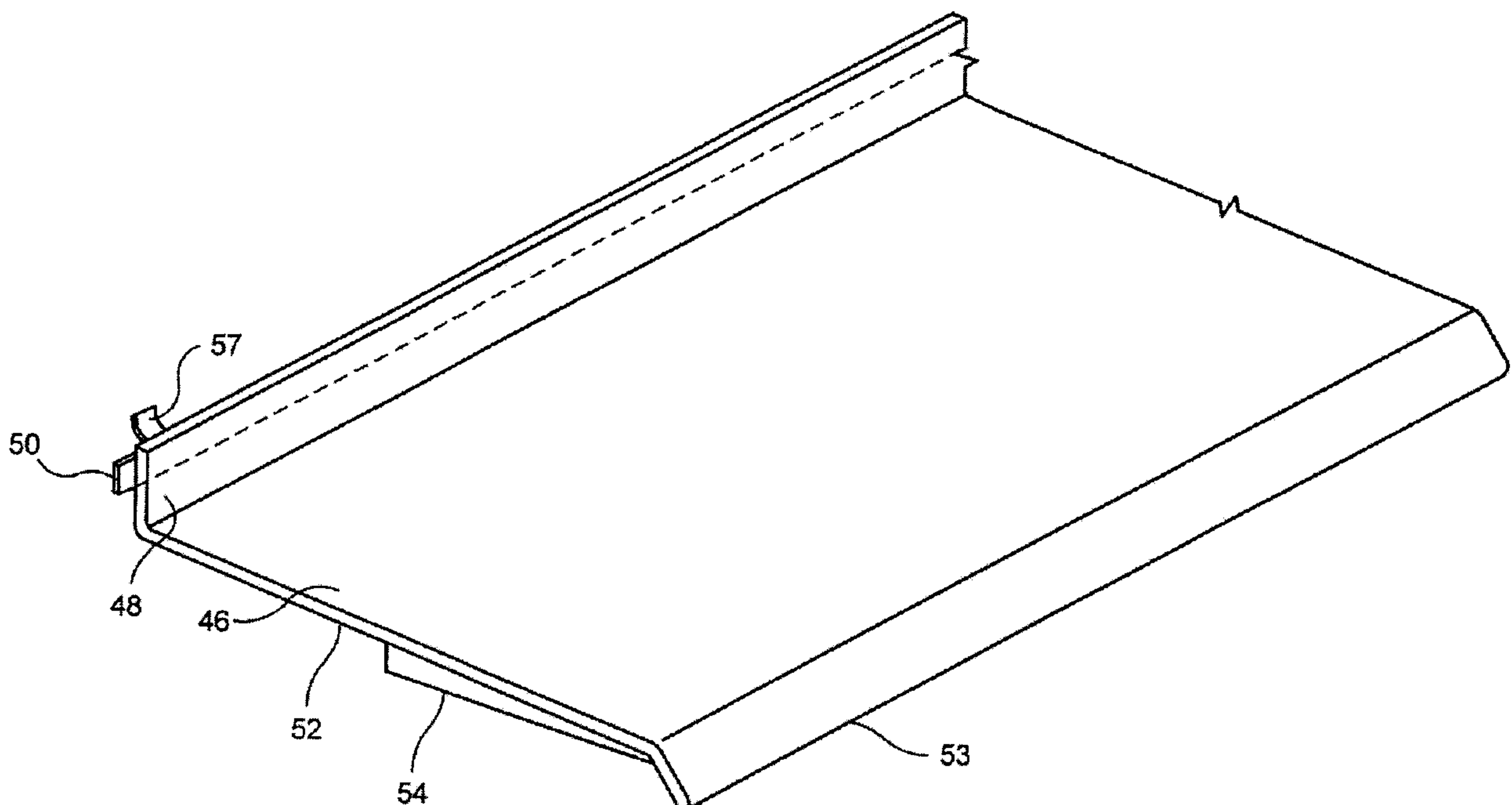
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(54) Titre : BORDURE DE TOIT POLYMERIQUE MOULEE

(54) Title: MOLDED POLYMERIC DRIP EDGE



(57) Abrégé/Abstract:

A drip edge device is disclosed for use with the drainage system of a cavity wall structure. The drip edge device is disposed in the outer wythe, above the shelf angle or lintel, of a cavity wall structure extending the flashing and directing water and water vapor collected within the cavity wall to the weep holes and beyond the exterior surface of the outer wythe. The drip edge further allows for cavity wall ventilation. Removal of the water and the water vapor inhibits staining and material degradation. The drip edge device is a molded polymeric which withstands adverse environmental elements, including ultraviolet radiation. The drip edge device includes a peel-and-stick hot melt adhesive which, upon pressure activation, creates a durable bond with the rough surface of the masonry block or the flashing material. Optionally, a foam layer is placed on the lower surface of the drip edge.

ABSTRACT

A drip edge device is disclosed for use with the drainage system of a cavity wall structure. The drip edge device is disposed in the outer wythe, above the shelf angle or lintel, of a cavity wall structure extending the flashing and directing water and water vapor collected within the cavity wall to the weep holes and beyond the exterior surface of the outer wythe. The

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10 layer is placed on the lower surface of the drip edge.

MOLDED POLYMERIC DRIP EDGE

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

[0001] This invention relates to a drip edge for use with a flashing system for a cavity wall structure, and more specifically to an improved molded polymeric drip edge that is an integral part of the flashing system.

DESCRIPTION OF THE PRIOR ART

[0002] In the past, investigations relating to cavity wall flashing systems for brick veneer masonry construction have been conducted. Flashing systems for cavity wall structures generally include flashing, weep holes and drip edges. While strides have been made in flashing-related technologies, including elastomeric materials and hot melt adhesives, there still remain several areas where continued development is ongoing.

[0003] The inventor's patents and their assignee's product line are all related to accessories for cavity wall structures and include insulation, anchoring and seismic devices, and flashing and are sold under the trademarks of Seismiclip[®], Byna-Tie[®], DW-10-X[®], and FLEX-FLASH[™]. These products, which are manufactured by Hohmann & Barnard, Inc., Hauppauge, NY 11788, have become widely accepted in the industry and have provided the inventors with particular insight into the technological needs of this marketplace.

[0004] Masonry walls with brick veneer are designed with an inner and an outer wythe and a cavity therebetween. The masonry block inner wythe and insulation thereon isolates the interior of the building from the environment, while the brick veneer outer wythe provides an aesthetic finish to the building. The walls of a building are constructed to exclude water and water vapor from the interior. Since the presence of excessive levels of water or water vapor in the cavity hastens the deterioration of building materials, various masonry drainage systems have been proposed.

[0005] Because of widespread usage and familiarity with bituminous and asphaltic products in roofing applications, when masonry flashing systems were first designed, the building construction industry adopted the familiar copper and asphalt products. At that time the technology of pressure-sensitive hot melt adhesives needed for peel-and-stick applications was insufficiently developed. Some critics indicated that the adhesive quality was insufficient for the rough masonry block surfaces. Because of the presence of plasticizers, others were apprehensive about the available hot melt adhesives meeting the requisite fire retardancy standards. Also, to

provide fire retardancy, some pressure-sensitive products were marketed for building construction use with inorganic fillers, such as alumina trihydrate, antimony oxide or calcium carbonate. However, these filled pressure-sensitive products had disadvantages, such as application problems, phase separation, toxicity, and reduced adhesion upon activation.

[0006] Prefabricated peel-and-stick flashing materials have been proposed, such as those shown in Harkness, U.S. Pat. No. 4,775,567 (see *infra*). These materials have included layers of bitumen and of compound bitumen for adhering the materials to the exteriors of masonry walls. While, under ideal circumstances, these peel-and-stick materials were easy to apply, the patent literature indicates that these materials did not conform well to irregular surfaces. Thus, the prior art bitumens used to secure these flashing materials to masonry walls often lacked the tackiness to bond tightly and durably to the wall surfaces. On occasion, when circumstances were not ideal, the bituminous materials drooled marring the aesthetics of the brick veneer.

[0007] Despite these early efforts, developing the right combination of materials and methods for flashing cavity walls in a fast and efficient manner has proved elusive. In addition to the above described technical problems, because there is frequently a delay in erecting the inner wythe and the outer wythe, the flashing installed in the inner wythe is often exposed to substantial ultraviolet radiation. Thus, standards similar to ASTM Specification D4434-96 for polyvinylchloride sheet roofing need to be met by masonry flashing systems.

[0008] As flashing for cavity walls involves numerous technological considerations, including, but not limited to, tensile strength, puncture- and tear-resistance, UV exposure, water absorption, pliability, peel and lap adhesion, and flammability, various industry standards under ASTM have arisen which serve as a guide to flashing manufacturers, architectural engineers, and others preparing and meeting construction specifications. Among the relevant ASTM standards are ASTM D 624, *Standard test method for tear strength of...thermoplastic elastomers*; ASTM D 412, *Standard test method for....thermoplastic elastomers - tension*; ASTM D 2240, *Standard test method for rubber property - durometer hardness* (applies to thermoplastic elastomers); and, ASTM G 154, *Standard practice for operating fluorescent light apparatus for UV exposure of nonmetallic materials*.

[0009] When possible, flashing for cavity walls should extend beyond the face of the outer wythe. This extension is accomplished through the use of a drip edge, which is secured to either the outer wythe under the flashing or to the flashing itself, and extends through the inner wythe to allow for drainage. The drip edge is premolded at an angle and disposed in the inner wythe to drain any water in the cavity through the inner wythe and away from the wall structure.

Because the drip edge requires dimensional stability and will be exposed to UV light, which can cause significant deterioration of some materials, careful consideration must be given to the type of material used.

[0010] A common choice of drip edge material is stainless steel. Stainless steel has excellent chemical resistance and does not stain masonry. However, stainless steel is difficult to accurately shape and can be bent or otherwise misshapen at the construction site. Further, stainless steel does not match brick, or other masonry outer wythes, creating an aesthetically-displeasing effect. Copper is another common choice because it is durable and easy to form and solder, but exposed copper may stain adjacent masonry and can be damaged if caustic alkalis are present in the mortar. Plastic or rubber flashing is generally easy to form and join, but because exposure to UV light causes degradation and dimensional stability is also a concern it is not a good choice for drip edge material. The shortcomings of the aforementioned materials show the need for an improved drip edge

[0011] The present invention provides a polymeric based drip edge that solves the problems associated with the prior art materials and provides a simple and economical drip edge solution. The polymeric drip edge is extremely tough, holds its shape after extrusion and is not susceptible to UV degradation. Further, the drip edge can be color matched to the individual mortar or brick color to hide its presence. The present invention employs a "peel-and-stick" pressure-sensitive, clear adhesive that provides a firm bond and does not leach onto the exterior of the building. The drip edge can be easily positioned in the outer wythe through either an optional foam attachment or by simply propping it up on rolled flashing.

[0012] In preparing for this application the following patents came to the attention of the inventors and are believed to be relevant to the further discussion of the prior art:

<u>Patent</u>	<u>Inventor</u>	<u>Issue Date</u>
6,964,136	Collins	November 15, 2005
6,945,000	Hohmann et al.	September 20, 2005
6,928,780	Hohmann et al.	August 16, 2005
6,584,746	Hohmann et al.	July 1, 2003
6,224,700	Oakley	May 1, 2001
6,035,582	Pacific	March 14, 2000
5,870,864	Snyder	February 16, 1999
5,860,259	Laska	January 19, 1999
4,910,931	Pardue	March 27, 1990
4,775,567	Harkness	October 4, 1988
4,755,409	Harkness	July 5, 1988
4,295,911	Haage et al.	October 20, 1981
4,239,795	Haage et al.	December 16, 1980

US Patent 6,964,136 - Collins - issued November 15, 2005

[0013] Collins describes a combination flashing and weep apparatus to detail sills and lintels to avoid water accumulations and provide drainage through the use of a two-panel extrusion. A second embodiment secures the flashing and weep apparatus to the outer face of the inner wall at the sill or lintel of the door, window or other opening.

US Patent 6,945,000 - Hohmann *et al.* - issued September 20, 2005

[0014] A metal-foil flashing laminate for cavity walls with at least one layer of an elastomeric composite under a hot melt adhesive layer is taught. The laminate is used with release paper to form a peel-and-stick product suitable for surface mounting. A termination bar is used with the flashing.

US Patent 6,928,780 - Hohmann *et al.* - issued August 16, 2005

[0015] A metal foil/scrim flashing laminate for a cavity wall with at least one layer of roll coated polymeric coating on the central metal foil is disclosed. The metal foil lamina is either set between layers of the polymeric coating or between a coating layer and a hot melt adhesive layer. The laminates are used with release paper to form a peel-and-stick product suitable for surface mounting.

US Patent 6,584,746 - Hohmann *et al.* - issued July 1, 2003

[0016] A masonry flashing system for cavity walls which includes a hot melt adhesive coated reinforced laminate is disclosed. The system includes a stainless steel drip plate with a hot melt adhesive coating that works in conjunction with the laminate to redirect waterflow away from the cavity wall. A stainless steel drip edge is used with the masonry flashing system because the disclosed elvaloy flashing lacks the resilience needed to form a drip edge.

US Patent 6,224,700 - Oakley - issued May 1, 2001

[0017] Oakley in U.S. Patent 6,224,700 (assigned to Mar-Flex Systems, Inc., Middletown, Ohio) describes a method of applying a composite material to an above-grade building component to form a tacky non-swelling elastomeric membrane. Thereafter, a flexible, non-porous polymeric sheet is pressed onto the tacky exterior of the elastomeric membrane. The polymeric sheet is stronger than the elastomeric membrane and protects the elastomeric membrane from punctures or tears. Here, *in situ* construction is both labor intensive and requires special equipment for installation.

US Patent 6,035,582 - Pacific - issued March 14, 2000

[0018] Pacific describes a flashing material which includes a sheet layer of copper, aluminum or other metal or a thin sheet of unreinforced plastic. Here it appears that *in situ* adhesives are applied.

US Patent 5,870,864 - Snyder - issued February 16, 1999

[0019] Snyder describes a drainage system employing water collection pans for insertion into the interior cavities of masonry block units. The system extends over the length of a selected block wall course; drains water collected from the interior cavities of the upper courses; and, directs water to the exterior of the wall.

US Patent 5,860,259 - Laska - issued January 19, 1999

[0020] Laska describes an insulated drainage panel for use in cavity wall or veneer wall construction, which panel includes a planar insulating board with a porous structure thereof.

US Patent 4,910,931 - Pardue - issued March 27, 1990

[0021] In the Pardue patent, a water collection and drainage system is described for a masonry block wall having bond beam block courses and intervening standard block courses. A system of upper water collection pans is supported along each upper bond beam course. Downspouts leading from drain openings in the upper collection pans drain collected from the pans through the vertical block cavities in lower block courses to the next lower series of collection pans. Weeping spouts head laterally from the base collection pans to the exterior of the wall to continuously drain collected water from the interior wall cavities.

US Patents 4,775,567 and 4,755,409 - Harkness - issued October 4, 1988 and July 5, 1988, respectively

[0022] A waterproofing laminate suitable for use in roofs, floors or other surfaces where waterproofing is desired contains a reinforcing sheet, first and second bitumen layers secured to opposite surfaces of the reinforcing sheet, first and second compound bitumen layers secured to the bitumen layers, an elastomeric sheet secured to the first compound bitumen layer and a release sheet secured to the second compound bitumen layer. Certain preferred materials for use in the laminate are recited.

US Patents 4,295,911 and 4,239,795 - Haage *et al.* - October 20, 1981 and December 16, 1980, respectively

[0023] A protective covering for the protection of surface seals against mechanical damage in building constructions and other civil engineering constructions which comprises a composite of an elastic, waterproof thermoplastic synthetic resin film sheet and/or synthetic resin layer and a lattice-like fabric having knot couplings or points of intersection of the threads that yield under the effect of a load.

[0024] The use of the polymeric drip edge of this invention in a cavity wall structure is an integral part of the flashing system. The drip edge described herein holds its shape and

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provides a seal with the flashing structure and together with the weep holes directs water or water vapor outside the structure, protecting against deterioration of the cavity wall structure.

SUMMARY

5 **[0025]** In general terms, the drip edge device disclosed hereby is an integral part of the flashing system for cavity wall structures. The drip edge device is disposed in the outer wythe, above the shelf angle or lintel, of a cavity wall structure and directs water and water vapor collected within the cavity wall to the weep holes and beyond the exterior surface of the outer wythe. The drip edge
10 further allows cavity wall ventilation. Removal of the water and water vapor inhibits staining and material degradation.

[0026] The drip edge device is a molded polymeric which withstands adverse environmental elements, including ultraviolet radiation. Further, the drip edge device can be color matched to the adjacent mortar or brick
15 to provide an aesthetically pleasing outer wythe.

[0027] The drip edge device includes a hot melt adhesive which coats a surface of the drip edge device. The adhesive is selected for compatibility with a peel-and-stick installation, thus, upon pressure activation, when, for instance, the drip edge device with the hot melt adhesive thereon is pressed
20 against the rough surface of the masonry block or the flashing material, a durable bond is created. The drip edge adhesive coating enables the installer to accurately position the drip edge and, during construction, maintain the alignment thereof. Optionally, a foam layer is placed on the lower surface of the drip edge.

 According to the present invention, there is provided a drip edge
25 device for use in a cavity wall with an inner wythe and an outer wythe with said outer wythe having an exterior surface flashing therewithin, and said cavity wall having a drainage system therethrough, said drip edge device comprising, in combination: a molded unitary base formed from an elastomeric compound having two major surfaces, said base in turn comprising: an upper portion
30 adapted for disposition between said inner wythe and said flashing material; a

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middle portion; and a lower portion extending out from the middle portion at a nonorthogonal angle to the upper portion and to the middle portion, the lower portion being adapted, upon mounting on said outer wythe, to extend beyond said exterior surface of said outer wythe and to direct water away from said exterior surface of said outer wythe; whereby, upon mounting
 5 said drip edge device on said outer wythe, said drip edge device conducts water collected within said cavity wall to said drainage system inhibiting staining and material degradation.

According to another aspect of the present invention, there is provided a drip edge device for use in a cavity wall with an inner wythe and an outer wythe with said outer wythe having an exterior surface flashing therewithin, and said cavity wall having a drainage
 10 system therethrough, said drip edge device comprising, in combination: a molded unitary base formed from an elastomeric composite having two major surfaces, said base in turn comprising: an upper portion adapted for disposition between said inner wythe and said flashing material; a lower portion adapted, upon mounting on said outer wythe, to extend beyond said exterior surface of said outer wythe and to direct water away from said exterior
 15 surface of said outer wythe; and, a middle portion having a first end affixed to said upper portion and a second end affixed to said lower portion adapted, upon installation into said cavity wall, to have said first end lie in a higher longitudinal plane than said second end, the lower portion extending from the middle portion at a nonorthogonal angle to the middle portion and to the upper portion; whereby, upon mounting said drip edge device on said outer
 20 wythe, said drip edge device conducts water collected within said cavity wall to said drainage system, inhibiting staining and material degradation.

According to a further aspect of the present invention, there is provided a drip edge device for use in a cavity wall with an inner wythe and an outer wythe with said outer wythe having an exterior surface flashing therewithin, and said cavity wall having a drainage
 25 system therethrough, said drip edge device comprising, in combination: a molded unitary base formed from an elastomeric composite having two major surfaces, said base in turn comprising: an upper portion adapted for disposition between said outer wythe and said flashing material; and, a lower portion adapted, upon mounting on said outer wythe, to

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extend beyond said exterior surface of said outer wythe and to direct water away from said exterior surface of said outer wythe, the lower portion extending at a nonorthogonal angle to the upper portion; whereby, upon mounting said drip edge on said outer wythe, said drip edge device conducts water collected within said
5 cavity wall to said drainage system, inhibiting staining and material degradation.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028] In the following drawings, the same parts in the various views are afforded the same reference designators.

[0029] FIG. 1 is a perspective view of a first embodiment of a drip
10 edge device of this invention and shows a wall with an inner wythe of masonry block and an exterior wythe of brick having a through-wall drainage system installed therein;

[0030] FIG. 2 is a cross sectional view of **FIG. 1** taken along a plane bisecting the outer wythe showing the drip edge device disposed within the outer
15 wythe;

[0031] FIG. 3 is a perspective view of an uninstalled drip edge device of the first embodiment;

[0032] FIG. 4 is a perspective view of a second embodiment of a drip edge device of this invention and shows a wall with an inner wythe of
20 masonry block and an exterior wythe of brick having a through-wall drainage system installed therein;

[0033] FIG. 5 is a perspective view of the uninstalled drip edge device of the second embodiment.

DETAILED DESCRIPTION OF THE DRAWINGS

[0034] In the embodiments described hereinbelow, the drip edge device of this invention employs an innovative design with novel material that works in conjunction with the flashing system for a cavity wall structure and can withstand adverse weather conditions. The novel drip edge device is a molded polymeric that is disposed in the outer wythe above a lintel or shelf angle. The drip edge device works with the flashing system to protect the structure against deterioration by removing water and ventilating the cavity wall.

[0035] Proper design, detailing and construction of cavity wall structures are necessary to minimize water penetration into or through the cavity wall. Protecting a cavity wall from water is desirable because if a cavity wall is saturated with water, freezing and thawing may cause cracking, crazing, spalling and disintegration over time. Further, water can cause dimensional changes, corrosion, reduce insulation effectiveness, and cause mold growth.

[0036] Construction of drainage wall systems such as cavity walls are designed to combat water penetration. A cavity wall is designed to allow water to flow inward to the cavity between the wythes, where it is collected on the flashing and redirected out of the cavity wall through weeps by a drip edge, which is disposed on the inner wythe.

[0037] Referring now to FIGS. 1-3, views of the first embodiment of this invention in which a drainage system within a cavity wall structure, referred to generally by the reference designator 10, are shown. In this embodiment, a cavity wall structure 12 is shown having an inner wythe 14 of masonry blocks 16 and an outer wythe 18 of facing brick 20. Between the inner wythe 14 and the outer wythe 18, a cavity 22 is formed. Successive bed joints 24 and 26 are formed between courses of blocks 16 and the joints are substantially planar and horizontally disposed. Also, successive bed joints 28 and 30 are formed between courses of bricks 20 and the joints substantially planar and horizontally disposed. Selected bed joint 24 and bed joint 30 are constructed to align, that is to be substantially coplanar, the one with the other.

[0038] For purposes of this discussion, the exterior surface 32 of the inner wythe 14 contains a horizontal line or x-axis 34 and an intersecting vertical line or y-axis 36. A horizontal line or z-axis 38 also passes through the coordinate origin formed by the intersecting x-and y-axes. In the discussion which follows, it will be seen that the drainage system 10 of this invention is constructed to completely seal the cavity, to drain water therefrom and to permit air and water vapor to exit using the drip edge device 46 and weep hoes 40.

[0039] Affixed to the inner wythe 14, in this embodiment, a through-the-wall installation of the masonry flashing 59 is shown. The details of this embodiment can also be applied in the same manner for surface mounted flashing. The masonry flashing 59 is constructed for embedment in bed joint 26 in an x-z plane, for adherence to surface 32 in an 3-y plane. In this mode, it is seen that the flashing 59 is installed behind optional insulation 44. Between the flashing 59 and the inner wythe 14, the upper portion of the drip edge device is secured against the inner wythe 14 through the use of a peel-and-stick hot melt adhesive 50 to improve the communication between the drainage system 10 and weep holes 40.

[0040] The lower portion 53 of the drip edge device 46 is disposed in the bed joint 28 of the outer wythe 18 and connected to the upper portion 48 by the middle portion 52 at an angle that facilitates drainage of the water and water vapor beyond the exterior surface 45 of the outer wythe 18. The drip edge device 46 can be installed flat in the bed joint 28 or propped up using either a loop of flashing (not shown) or an affixed resilient layer of foam polymeric material 54 mounted on the lower portion of the drip edge device 46 to better direct the flow of water and water vapor into the drainage system 10 and outside the exterior surface 45 of the outer wythe 18. The foam polymeric material 54 is constructed from material selected from a group consisting of cross-linked polyethylene, non-cross-linked polyethylene, and closed-cell neoprene sponge.

[0041] The drip edge device 46 is constructed from a rigid extruded polymeric molded to an optimal shape to direct water to the weep holes 40 and away from the exterior surface 45 of the outer wythe 18. The lower portion 53 of the drip edge device 46 is optimally offset at a 45 degree angle. To further seal and place the drip edge device 46, optional sealant 58 and a backer rod 60 may be disposed in the bed joint 28.

[0042] The molded polymeric is UV resistant and contains at least one material selected from the group consisting of ethylenepropylene diene monomer, polyisobutylene, chlorinated polyethylene, natural rubber, polyvinyl chloride, ethylene vinyl acetate, and chlorosulfonated polyethylene. A specifically preferred formulation for the drip edge device includes about 10 to 40 percent by weight of unplasticized polyvinyl chloride, and about 10 to 40 percent by weight of an ethylene vinyl acetate carbon monoxide terpolymer. The drip edge device 46 may also contain up to about 15 percent of primary or secondary plasticizer with, or without, up to about 10 percent of processing aids or stabilizers.

[0043] The drip edge device 46 contains polyvinyl chloride is preferable range of about 20 to 30 percent by weight of the entire composition and may advantageously be provided as a suspension or emulsion grade of polyvinyl chloride. The ethylene vinyl acetate carbon monoxide

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terpolymer may contain about 15 to 85 percent ethylene, about 5 to 60 percent vinyl acetate, and about 0.5 to 30 percent carbon monoxide, all on a weight basis. A suitable terpolymer for use in this context is that marketed by E. I. du Pont de Nemours & Company under the trademark *Elvaloy*, with the preference being for *Elvaloy 742*.

[0044] A peel-and-stick polymeric membrane 50 is affixed to the exterior surface of the upper portion 48 of the drip edge device 46 which surface faces the exterior surface 32 of the inner wythe 14. When the release sheet 57 is removed, the drip edge device 46 is affixed to the exterior surface 32 of the inner wythe 14 behind the flashing 59 to inhibit water from reaching the inner wythe 14 and to direct any water or water vapor into the drainage system 10.

[0045] The peel-and-stick polymeric membrane 50 includes a hot melt adhesive layer which is formulated for pressure activation and compatibility with a release sheet 57 adhered thereto. The adhesives described herein are particularly useful for peel-and-stick applications in building construction industry as such adhesives are readily pressure activated after the release paper is removed. The adhesive is formulated so that, in case of fire, the coatings thereof will not contribute to smoke or accelerate flame spreading and thus do not require inorganic fillers which are known to interfere with the adhesive function. Also, the adhesives are formulated to have sufficient tackiness so that a durable bond between the membrane and the rough and porous surface of the masonry block is experienced.

[0046] In the D Rado *et al.* patent, U.S. Patent 5,106,447, the hot melt adhesive compositions of hot melt layer may be prepared from 10 to 50 weight percent of an isotactic thermoplastic polybutene-1/ethylene copolymer containing from about 5.5 to about 10% by weight ethylene (polybutylene); 20 to 50 percent of a tackifier; 15 to 50 percent of an amorphous diluent having a softening point greater than 90 degrees C.; 0 to 2 percent of the stabilizer; and, 0 to 5 percent wax.

[0047] The polybutylene copolymers employed herein are copolymers of polybutene-1 and ethylene wherein the ethylene content varies from about 5.5 to about 10% by weight of the copolymer. The applicable isotactic polybutylenes are relatively rigid while in their plastic form but flow readily upon being heated. Expressing molecular weight in terms of melt index, the applicable isotactic polybutylenes to be used in the present adhesive should exhibit a melt index in the range of from about 5 to 2000 dg/min and preferably from 400 to 700- dg/min. The latter melt flow values are determined by the method described in ASTM D1238 and are inversely related to molecular weight, i.e., the lower the melt index, the higher the molecular weight. These copolymers are available from Shell Chemical Company under the Duraflex trademark as

Duraflex 8310, 8410, 8510 and 8910, with the 8910 having a melt index of about 700, a grade preferred for use herein. Mixtures of these copolymers may also be used.

[0048] The tackifying resins which may be used to extend the adhesive properties of the isotactic polybutylene include: (1) hydrogenated wood rosin or rosin ester; (2) polyterpene resins having a softening point, as determined by an ASTM method E28-58T, of from about 80 degrees C. to 150 degrees C., the latter polyterpene resins generally resulting from the polymerization of terpene hydrocarbons in the presence of Friedel-Crafts catalysts at moderately low temperatures and including the latter resins which are aromatically modified; examples of commercially available resins of this type being the Nirez resins sold by Reichhold Chemical, the Zonatac resins sold by Arizona, and the Piccolyte S-10, S-25, S-40, S-85, S-100, S-115, S-125 and S-135 resins as sold by Hercules Chemical; (3) aliphatic petroleum hydrocarbon resins having a Ball and Ring softening point of from about 80 degrees C. to 160 degrees C., resulting from polymerization of monomers consisting primarily of 5 carbon atom olefins and diolefins, and including the latter resins which are aromatically modified, examples of commercially available resins of this type being Wingtack 95 and Wingtack Extra as sold by the Goodyear Tire and Rubber Company and the Escorez 1000 series of resins sold by the Exxon Chemical Corporation; and, (4) partially and fully hydrogenated hydrocarbon resins such as Resin H-130 from Eastman, Escorez 5000 series from Exxon, and Regalrez from Hercules. The amorphous diluents which are needed and present in the adhesive composition include (atactic) amorphous polypropylene or other similar high softening point (i.e. greater than 90 degrees C.), low crystalline diluent, (e.g. amorphous polyalphaolefins). These diluents, are used at levels of 20 to 50% by weight, preferably about 20 to 25% by weight.

[0049] To test the degree of tackiness of the above-described flashing structure, a pull test is performed. An Elvaloy 742 (see paragraph 040 above) 8-inch by 12-inch sample is coated with a hot melt adhesive, which hot melt adhesive formulation includes one or more of the aforementioned tackifying resins. A suitable release paper is applied thereover. After a prescribed cure period, the release paper is removed and the flashing of this invention is applied to the surface of a concrete block. The application to the concrete block is at room temperature utilizing a hand-operated laminating roller to provide the pressure activation. A spring scale is then attached to the masonry flashing and a 65 lb. force is required to peel the flashing from the block. Repeating the test for SBS-modified, peel-and-stick flashing, a force of 27 lb. (max.) is required to peel the flashing from the block.

[0050] Among the applicable stabilizers or antioxidants utilized herein are included high molecular weight hindered phenols and multifunctional phenols such as sulfur and

phosphorous-containing phenols. Representative hindered phenols include: 1,3,5-trimethyl 2,4,6-tris (3,5-di tert-butyl-4-hydroxy-benzyl) benzene; pentaerythrityl tetrakis-3 (3,5-di-tert-butyl-4- hydroxyphenyl) propionate; 4,4'-methylenbis(2,6-tert-butyl-phenol); 4,4'-thiobis (6-tert-butyl-o-cresol); 2,6-di-tertbutylphenol; 6-(4-hydroxyphenoxy)-2,4-bis(n-octyl-thio)-1,3,5-triazine; di-n-octadecyl 3,5-di-tert-butyl-4-hydroxy-benzylphosphonate; 2-(n-octylthio) ethyl 3, 5 - di-tert-butyl-4-hydroxybenzoate; and, sorbitol hexa[3-(3,5-di-tert-butyl-4-hydroxyphenyl)-propionate].

[0051] The performance of these antioxidants may be further enhanced by utilizing, in conjunction therewith known synergists such, for example, as thiodipropionate esters and phosphites. Particularly useful is distearylthiodipropionate. These stabilizers are generally present in amounts of about up to 2 weight percent, preferably 0.25 to 1.0%. It is also possible to add minor amounts (i.e. less than about 5% by weight of the formulation) of other diluents such as (1) waxes including petroleum waxes such as a paraffin wax having a melting point of from about 50 degrees C. to 75 degrees C. and microcrystalline wax having a melting point of from about 50 degrees to 90 degrees C.; the latter melting points being determined by ASTM method D127-60; (2) low molecular weight (600 to 3000) liquid polybutene; (3) polyethylene greases having a softening point of from about 80 degrees C. to 100 degrees C. and a hardness value, as determined by ASTM method D-1321, of from about 60 degrees C. to 120 degrees C.; (4) hydrogenated animal, fish and vegetable fats and oil such as hydrogenated tallow, lard, soya oil, cottonseed oil, castor oil, menhaden oil and cod liver oil; and, (5) synthetic waxes made by polymerizing carbon monoxide and hydrogen, such as Fischer-Tropsch wax.

[0052] In addition, relatively small amounts (less than about 5%) of isotactic polypropylene may be employed as a reinforcing agent. Other additives such as flow modifiers, pigments, dyestuffs, etc., which are conventionally added to hot melt adhesives for various end uses may also be incorporated in minor amounts into the formulations of the present invention.

[0053] Referring now to Figures 4 and 5, a perspective view of the second embodiment of this invention in which a surface-mounted drainage system, referred to generally by the reference designator 110, is shown. In this embodiment, similar parts to those of the first embodiment are referred to by reference designators 100 units higher than a similar part in the first embodiment. Thus, for example, the masonry block 16 in the first embodiment has an analogous masonry block 116 in the second embodiment. Here a cavity wall structure 112 is shown having an inner wythe 114 of masonry blocks 116 and an outer wythe 118 of facing brick 120. Between the inner wythe 114 and the outer wythe 118, a cavity 122 is formed and optional insulation 144 is shown. Successive bed joints 124 and 126 are formed between courses of

blocks 116 and the joints are substantially planar and horizontally disposed. Also, successive bed joints 128 and 130 are formed between courses of bricks 120 and the joints are substantially planar and horizontally disposed. Selected bed joint 124 and bed joint 130 are constructed to align, that is to be substantially coplanar, the one with the other. For purposes of this discussion, the exterior surface 132 of the inner wythe 114 contains a horizontal line or x-axis 134 and an intersecting vertical line or y-axis 136. A horizontal line or z-axis 138 also passes through the coordinate origin formed by the intersecting x- and y-axis. In the discussion which follows, it will be seen that the drip edge device 146 is constructed to work in combination with the drainage system 110 to completely seal the cavity and to drain water and water vapor therefrom through weep holes 140 thereof.

[0054] Across the cavity of 122, in this embodiment, through wall flashing 159 is shown. However, the details of this embodiment can be applied in the same manner for surface mounted flashing. The drainage system 100 includes flashing 159 constructed for adherence to surface 132 in an x-y plane, for extending across and into bed joint 128 and sealing cavity 122, and for embedment in bed joint 128 in an x-y plane. The drip edge device 146 is disposed between the flashing 159 and the brick 120 to facilitate drainage beyond the exterior surface 145 of the outer wythe 118.

[0055] The lower portion 153 of the drip edge device 146 is disposed in the bed joint 128 of the outer wythe 118 and connected to the upper portion 148 at an angle that facilitates drainage of the water vapor beyond the exterior surface 145 of the outer wythe 118. The drip edge device 146 can be installed flat in the bed joint 128 or propped up using either a loop of flashing (not shown) or an affixed resilient layer of foam polymeric material 154 mounted on the upper portion 148 of the drip edge device 146 to better direct the flow of water and water vapor into the drainage system 110 and outside the exterior surface 145 of the outer wythe 118. The foam polymeric material 154 is constructed from material selected from a group consisting of cross-linked polyethylene, non-cross-linked polyethylene, and closed-cell neoprene sponge.

[0056] The drip edge device 146 is constructed from a rigid extruded polymeric molded to an optimal shape to direct water to the weep holes 140 and away from the exterior surface 145 of the outer wythe 118. The lower portion 153 of the drip edge device is optimally offset at a 45 degree angle. To further seal and place the drip edge device, optional sealant and a backer rod may be disposed in the bed joint 128.

[0057] The molded polymeric is UV resistant and contains at least one material selected from the group consisting of ethylenepropylene diene monomer, polyisobutylene, chlorinated polyethylene, natural rubber, polyvinyl chloride, ethylene vinyl acetate, and chlorosulfonated

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polyethylene. A specifically preferred formulation for the drip edge device includes about 10 to 40 percent by weight of unplasticized polyvinyl chloride, and about 10 to 40 percent by weight of an ethylene vinyl acetate carbon monoxide terpolymer. The drip edge device 46 may also contain up to about 15 percent of primary or secondary plasticizer with, or without, up to about 10 percent of processing aids or stabilizers.

[0058] The drip edge device 46 contains polyvinyl chloride is preferable range of about 20 to 30 percent by weight of the entire composition and may advantageously be provided as a suspension or emulsion grade of polyvinyl chloride. The ethylene vinyl acetate carbon monoxide terpolymer may contain about 15 to 85 percent ethylene, about 5 to 60 percent vinyl acetate, and about 0.5 to 30 percent carbon monoxide, all on a weight basis. A suitable terpolymer for use in this context is that marketed by E. I. du Pont de Nemours & Company under the trademark *Elvaloy*, with the preference being for *Elvaloy 742*.

[0059] A peel-and-stick polymeric membrane 150 is affixed to the exterior surface of the upper portion 148 of the drip edge device 146 which surface faces the flashing 159 that seals the cavity. When the release sheet 157 is removed, the drip edge device 146 is affixed to the flashing 159 to inhibit water from reaching the inner wythe 114 and to direct any water or water vapor into the drainage system 110.

[0060] The peel-and-stick polymeric membrane 150 is formulated for pressure activation and compatibility with a release sheet 157 adhered thereto. The adhesives described herein are particularly useful for peel-and-stick applications in building construction industry as such adhesives are readily pressure activated after the release paper is removed. The adhesive is formulated so that, in case of fire, the coatings thereof will not contribute to smoke or accelerate flame spreading and thus do not require inorganic fillers which are known to interfere with the adhesive function. Also, the adhesives are formulated to have sufficient tackiness so that a durable bond between the membrane and the rough and porous surface of the masonry block is experienced.

[0061] In the Di Rado *et al.* patent, U.S. Patent 5,106,447, the hot melt adhesive compositions of hot melt layer may be prepared from 10 to 50 weight percent of an isotactic thermoplastic polybutene-1/ethylene copolymer containing from about 5.5 to about 10% by weight ethylene (polybutylene); 20 to 50 percent of a tackifier; 15 to 50 percent of an amorphous diluent having a softening point greater than 90 degrees C.; 0 to 2 percent of a stabilizer; and, and 0 to 5 percent wax.

[0062] The polybutylene copolymers employed herein are copolymers of polybutene-1 and ethylene wherein the ethylene content varies from about 5.5 to about 10% by weight of the

polymer. The applicable isotactic polybutylenes are relatively rigid while in the plastic form but flow readily upon being heated. Expressing molecular weight in terms of melt index, the applicable isotactic polybutylenes to be used in the present adhesives should exhibit a melt index in the range of from about 5 to 2000 dg/min and preferably from 400 to 700 dg/min. The latter melt flow values are determined by the method described in ASTM D1238 and are inversely related to molecular weight, i.e., the lower the melt index, the higher the molecular weight. These copolymers are available from Shell Chemical Company under the Duraflex trademark as Duraflex 8310, 8410, 8510, and 8910, with the 8910 having a melt index of about 700, a grade preferred for use therein. Mixtures of these polymers may also be used.

[0063] The tackifying resins which may be used to extend the adhesive properties of the isotactic polybutylene include: (1) hydrogenated wood rosin or rosin ester; (2) polyterpene resins having a softening point, as determined by an ASTM method E28-58 T, of from about 80 degrees C. to 150 degrees C., the latter polyterpene resins generally resulting from the polymerization of terpene hydrocarbons in the presence of Friedel-Crafts catalysts at moderately low temperatures and including the latter resins which are aromatically modified; examples of commercially available resins of this type being the Nirez resins sold by Reichhold Chemical, the Zonatac resins sold by Arizona, and the Piccolyte S-10, S-25, S-40, S-85, S-100, S-115, S-125 and S-135 resins as sold by Hercules Chemical; (3) aliphatic petroleum hydrocarbon resins having a Ball and Ring softening point of from about 80 degrees C. to 160 degrees C., resulting from polymerization of monomers consisting primarily of 5 carbon atom olefins and diolefins, and including the latter resins which are aromatically modified, examples of commercially available resins of this type being Wingtack 95 and Wingtack Extra as sold by the Goodyear Tire and Rubber Company and the Escorez 1000 series of resins sold by the Exxon Chemical Corporation; and, (4) partially and fully hydrogenated hydrocarbon resins such as Resin H-130 from Eastman, Escorez 5000 series from Exxon, and Regalrez from Hercules. The amorphous diluents which are needed and present in the adhesive composition include (atactic) amorphous polypropylene or other similar high softening point (i.e. greater than 90 degrees C.), low crystalline diluent (e.g. amorphous polyalphaolefins). These diluents are used at levels of 20 to 50% by weight, preferably about 20 to 25% by weight.

[0064] To test the degree of tackiness of the above-described flashing structure, a pull test is performed. An Elvaloy 742 (see paragraph 040 above) 8-inch by 12-inch sample is coated with a hot melt adhesive, which hot melt adhesive formulation includes one or more of the aforementioned tackifying resins. A suitable release paper is applied thereover. After a prescribed cure period, the release paper is removed and the flashing of this invention is applied

to the surface of a concrete block. The application to the concrete block is at room temperature utilizing a hand-operated laminating roller to provide the pressure activation. A spring scale is then attached to the masonry flashing and a 65 lb. force is required to peel the flashing from the block. Repeating the test for SBS-modified, peel-and-stick flashing, a force of 27 lb. (max.) is required to peel the flashing from the block.

[0065] Among the applicable stabilizers or antioxidants utilized herein are included high molecular weight hindered phenols and multifunctional phenols such as sulfur and phosphorous-containing phenols. Representative hindered phenols include: 1,3,5-trimethyl 2,4,6-tris (3,5-di tert-butyl-4-hydroxy- benzyl) benzene; pentaerythrityl tetrakis-3 (3,5-di-tert-butyl-4-hydroxyphenyl) propionate; 4,4'-methylenbis(2,6-tert-butyl-phenol); 4,4'-thiobis (6-tert-butyl-o-cresol); 2,6-di-tertbutylphenol; 6-(4-hydroxyphenoxy)-2,4-bis(n-octyl-thio)-1,3,5-triazine; di-n-octadecyl 3,5-di-tert-butyl-4-hydroxy-benzylphosphonate; 2-(n-octylthio) ethyl 3, 5 - di-tert-butyl-4-hydroxybenzoate; and, sorbitol hexa[3-(3,5-di-tert-butyl-4-hydroxyphenyl)-propionate].

[0066] The performance of these antioxidants may be further enhanced by utilizing, in conjunction therewith known synergists such, for example, as thiodipropionate esters and phosphites. Particularly useful is distearylthiodipropionate. These stabilizers are generally present in amounts of about up to 2 weight percent, preferably 0.25 to 1.0%. It is also possible to add minor amounts (i.e. less than about 5% by weight of the formulation) of other diluents such as (1) waxes including petroleum waxes such as paraffin wax having a melting point of from about 50 degrees C. to 75 degrees C. and microcrystalline wax having a melting point of from about 60 degrees to 90 degrees C.; the latter melting points being determined by ASTM method D127-60; (2) low molecular weight (600 to 3000) liquid polybutene; (3) polyethylene greases having a softening point of from about 80 degrees C. to 100 degrees C. and a hardness value, as determined by ASTM method D-1321, of from about 60 degrees C. to 120 degrees C.; (4) hydrogenated animal, fish and vegetable fats and oil such as hydrogenated tallow, lard, soya oil, cottonseed oil, castor oil, menhaden oil and cod liver oil; and, (5) synthetic waxes made by polymerizing carbon monoxide and hydrogen, such as Fischer-Tropsch wax.

[0067] In addition, relatively small amounts (less than about 5%) of isotactic polypropylene may be employed as a reinforcing agent. Other additives such as flow modifiers, pigments, dyestuffs, etc., which are conventionally added to hot melt adhesives for various end uses may also be incorporated in minor amounts into the formulations of the present inventions.

[0068] Because many varying and different embodiments may be made within the scope of the inventive concept herein taught and because many modifications may be made in

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the embodiments herein detailed in accordance with the descriptive requirement of the law, it is to be understood that the details herein are to be interpreted as illustrative and not in a limiting sense.

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CLAIMS:

1. A drip edge device for use in a cavity wall with an inner wythe and an outer wythe with said outer wythe having an exterior surface flashing therewithin, and said cavity wall having a drainage system therethrough, said drip edge device comprising, in

5 combination:

a molded unitary base formed from an elastomeric compound having two major surfaces, said base in turn comprising:

an upper portion adapted for disposition between said inner wythe and said flashing material;

10 a middle portion; and

a lower portion extending out from the middle portion at a nonorthogonal angle to the upper portion and to the middle portion, the lower portion being adapted, upon mounting on said outer wythe, to extend beyond said exterior surface of said outer wythe and to direct water away from said exterior surface of said outer wythe;

15 whereby, upon mounting said drip edge device on said outer wythe, said drip edge device conducts water collected within said cavity wall to said drainage system inhibiting staining and material degradation.

2. A drip edge device for use in a cavity wall with an inner wythe and an outer wythe with said outer wythe having an exterior surface flashing therewithin, and said cavity

20 wall having a drainage system therethrough, said drip edge device comprising, in combination:

a molded unitary base formed from an elastomeric composite having two major surfaces, said base in turn comprising:

an upper portion adapted for disposition between said inner wythe and said

25 flashing material;

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a lower portion adapted, upon mounting on said outer wythe, to extend beyond said exterior surface of said outer wythe and to direct water away from said exterior surface of said outer wythe; and,

a middle portion having a first end affixed to said upper portion and a
5 second end affixed to said lower portion adapted, upon installation into said cavity wall, to have said first end lie in a higher longitudinal plane than said second end, the lower portion extending from the middle portion at a nonorthogonal angle to the middle portion and to the upper portion;

whereby, upon mounting said drip edge device on said outer wythe,
10 said drip edge device conducts water collected within said cavity wall to said drainage system, inhibiting staining and material degradation.

3. A drip edge device as described in Claim 2 wherein said molded base further comprises, in combination:

a hot melt adhesive layer mounted on said upper portion, said hot
15 melt adhesive, upon pressure activation, adapted by having sufficient tack to durably adhere to the surface of said inner wythe upon pressure activation; and,

a release sheet adhered to said hot melt adhesive layer, said release sheet being removable prior to mounting said drip edge device in said inner wythe,

20 whereby, upon mounting said drip edge device on said outer wythe, said drip edge device conducts water collected within said cavity wall to said drainage system.

4. A drip edge device as described in Claim 2 wherein said lower portion has a bottom portion adapted for placement on the outer wythe, said
25 molded base further comprising, in combination:

a resilient wedge of foam polymeric material mounted on said bottom portion of said lower portion;

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whereby, upon mounting said drip device on said outer wythe, said drip edge device conducts water collected within said cavity wall to said drainage system.

5. A masonry flashing system as described in Claim 4 wherein said foam polymeric material is selected from a group consisting of cross-linked polyethylene, and
5 closed-cell neoprene sponge.
6. A drip edge as described in Claim 2 wherein said drip edge device is composed of at least one material selected from a group consisting of ethylenepropylene diene monomer, polyisobutylene, chlorinated polyethylene, natural rubber, polyvinyl chloride, ethylene vinyl acetate, and chlorosulfonated polyethylene.
- 10 7. A drip edge device as described in Claim 6 wherein said drip edge device includes 10 to 40 percent by weight of unplasticized polyvinyl chloride, having a suspension or emulsion grade polyvinyl chloride in the range of 20 to 30 percent by weight, and 10 to 40 percent by weight of an ethylene vinyl acetate carbon monoxide terpolymer.
8. A drip edge device as described in Claim 6 wherein said drip edge device
15 contained up to 15 percent of primary or secondary plasticizer and up to 10 percent of processing aids or stabilizers.
9. A drip edge device as described in Claim 7 wherein said ethylene vinyl acetate carbon monoxide terpolymer contains 15 to 85 percent ethylene, 5 to 60 percent vinyl acetate, and 0.5 to 30 percent carbon monoxide, all on a weight basis.
- 20 10. A drip edge device as described in Claim 6 wherein said material contains a color additive to match to associated mortar or brick.
11. A drip edge device as described in Claim 6 wherein said material is UV resistant.
12. A drip edge device for use in a cavity wall with an inner wythe and an outer
25 wythe with said outer wythe having an exterior surface flashing

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therewithin, and said cavity wall having a drainage system therethrough, said drip edge device comprising, in combination:

a molded unitary base formed from an elastomeric composite having two major surfaces, said base in turn comprising:

5 an upper portion adapted for disposition between said outer wythe and said flashing material; and,

a lower portion adapted, upon mounting on said outer wythe, to extend beyond said exterior surface of said outer wythe and to direct water away from said exterior surface of said outer wythe, the lower portion extending at a
10 nonorthogonal angle to the upper portion;

whereby, upon mounting said drip edge on said outer wythe, said drip edge device conducts water collected within said cavity wall to said drainage system, inhibiting staining and material degradation.

13. A drip edge device as described in Claim 12 wherein said molded
15 base further comprises, in combination:

a hot melt adhesive layer mounted on said upper portion, said hot melt adhesive, upon pressure activation, adapted by having sufficient tack to durable adhere to the flashing upon pressure activation; and,

a release sheet adhered to said hot melt adhesive layer, said
20 release sheet being removable prior to mounting said drip edge device in said inner wythe,

whereby, upon mounting said drip edge device on said outer wythe, said drip edge device conducts water collected within said cavity wall o said drainage system.

25 14. A drip edge device as described in Claim 13 wherein said hot melt adhesive is compatible with flashing membranes containing ketone ethylene ester and meets industry flammability standards.

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15. A drip edge device as described in Claim 12 wherein said lower portion has a bottom portion adapted for placement on said outer wythe, said molded base further comprising, in combination:

a resilient wedge of foam polymeric material mounted on said
5 bottom portion of said lower portion;

whereby, upon mounting said drip edge device on said outer wythe, said drip edge device conducts water collected within said cavity wall to said drainage system.

16. A masonry flashing system as described in Claim 15 wherein said
10 foam polymeric material is selected from a group consisting of cross-linked polyethylene, non-cross-linked polyethylene, and closed-cell neoprene sponge.

17. A drip edge device as described in Claim 12 wherein said drip edge device is composed of at least one material selected from a group consisting of ethylenepropylene diene monomer, polyisobutylene, chlorinated polyethylene,
15 natural rubber, polyvinyl chloride, ethylene vinyl acetate, and chlorosulfonated polyethylene.

18. A drip edge device as described in Claim 12 wherein said drip edge device contains up to 15 percent of primary and secondary plasticizer and up to 10 percent of processing aids or stabilizers.

20 19. A drip edge device as described in Claim 12 wherein said drip edge device contains up to 15 percent of primary or secondary plasticizer and up to 10 percent of processing aids or stabilizers.

20. A drip edge device as described in Claim 19 wherein said ethylene vinyl acetate carbon monoxide terpolymer contains 15 to 85 percent ethylene, 5 to
25 60 percent vinyl acetate, and 0.5 to 30 percent carbon monoxide, all on a weight basis.

21. A drip edge as described in Claim 17 wherein said material contains a color additive to match the associated mortar or brick.

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22. A drip edge device as described in Claim 17 wherein said material is UV resistant.

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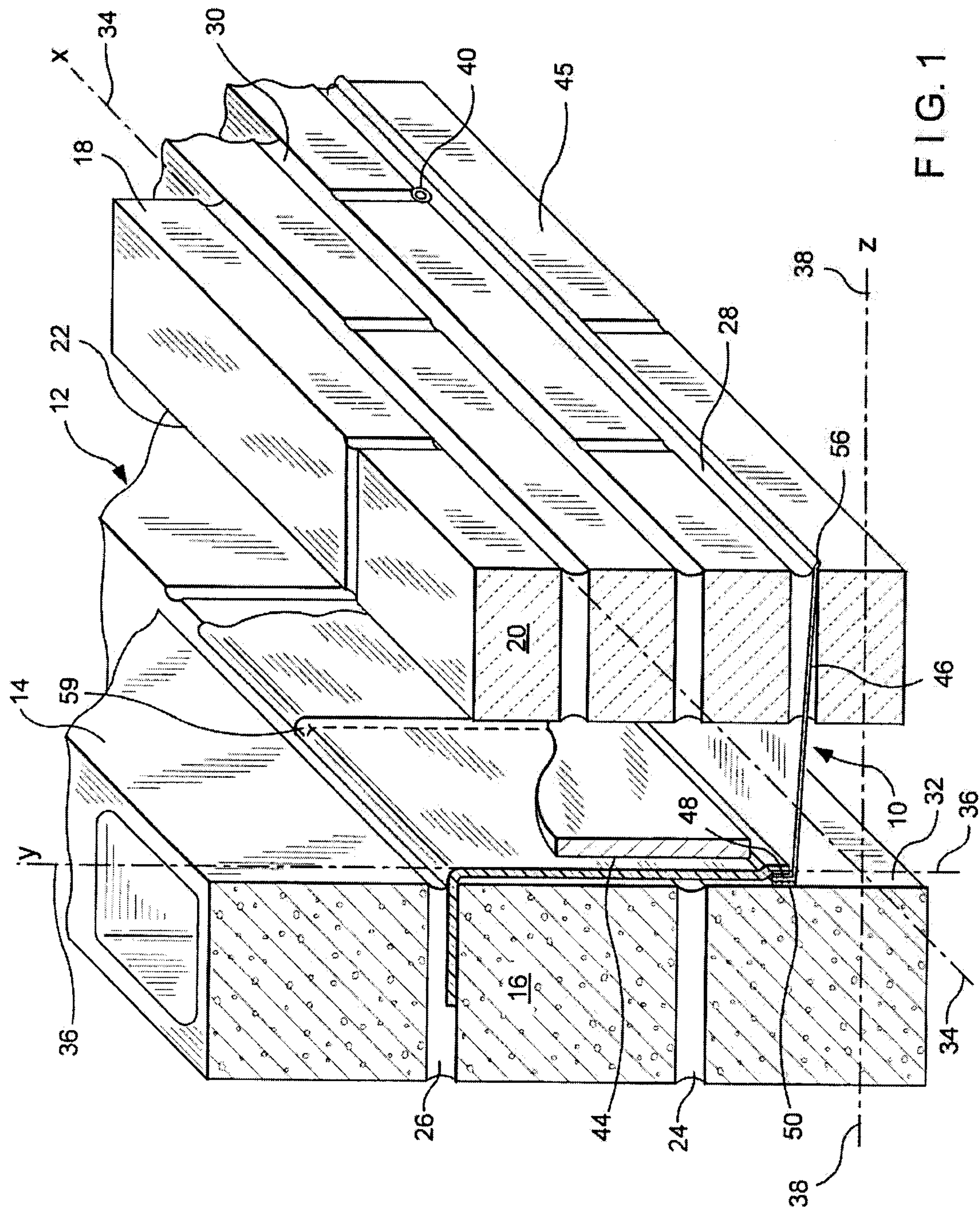


FIG. 1

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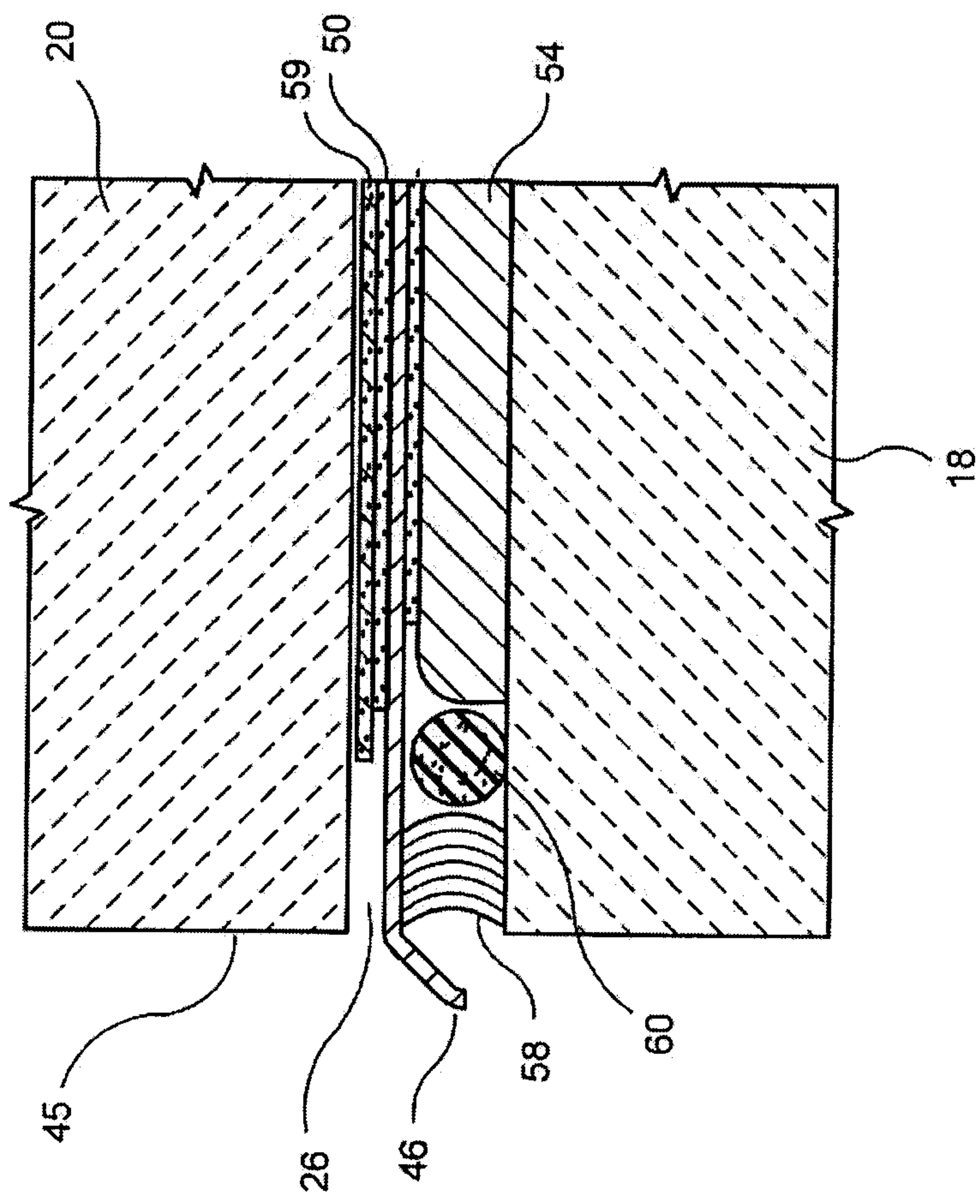


FIG. 2

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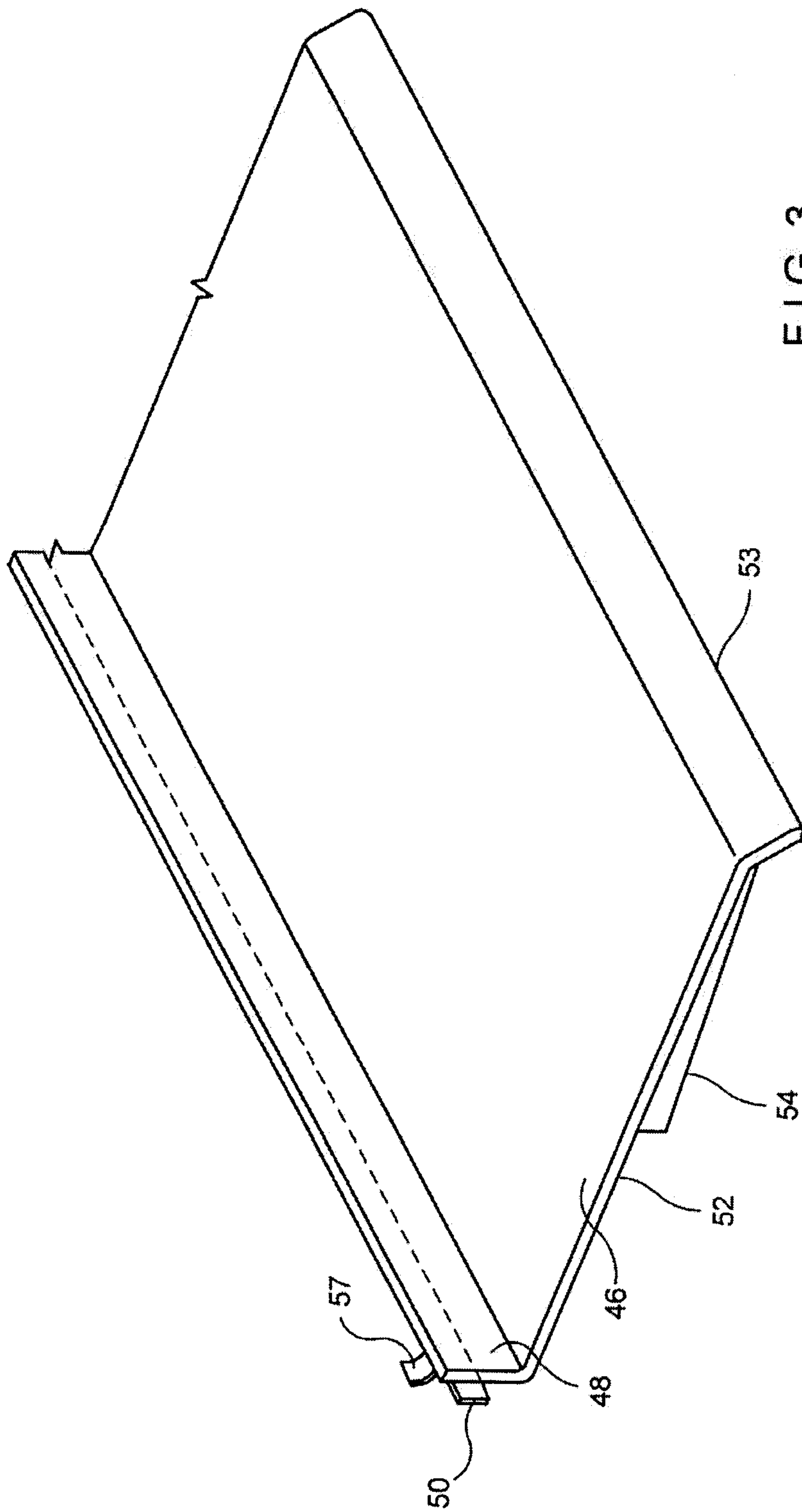


FIG. 3

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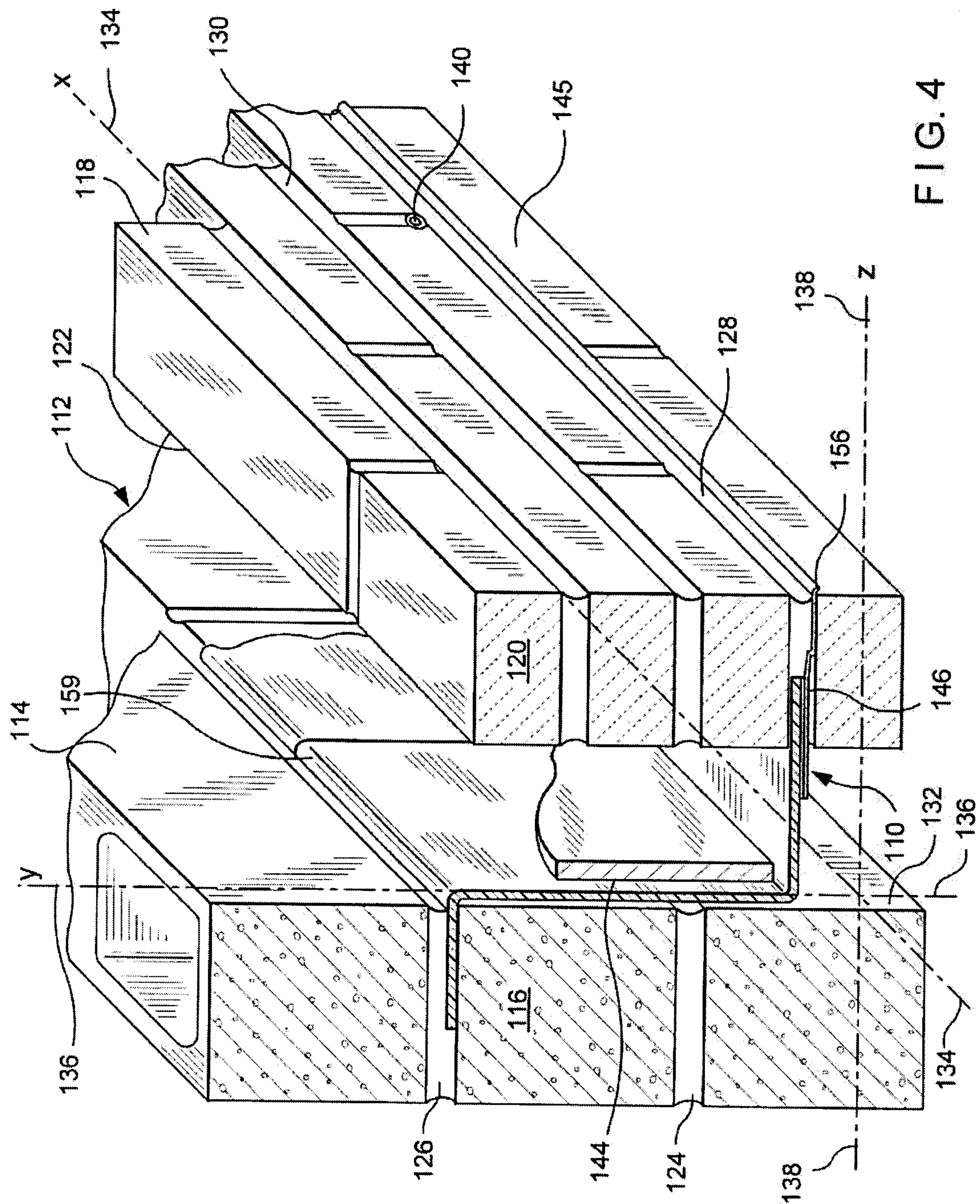


FIG. 4

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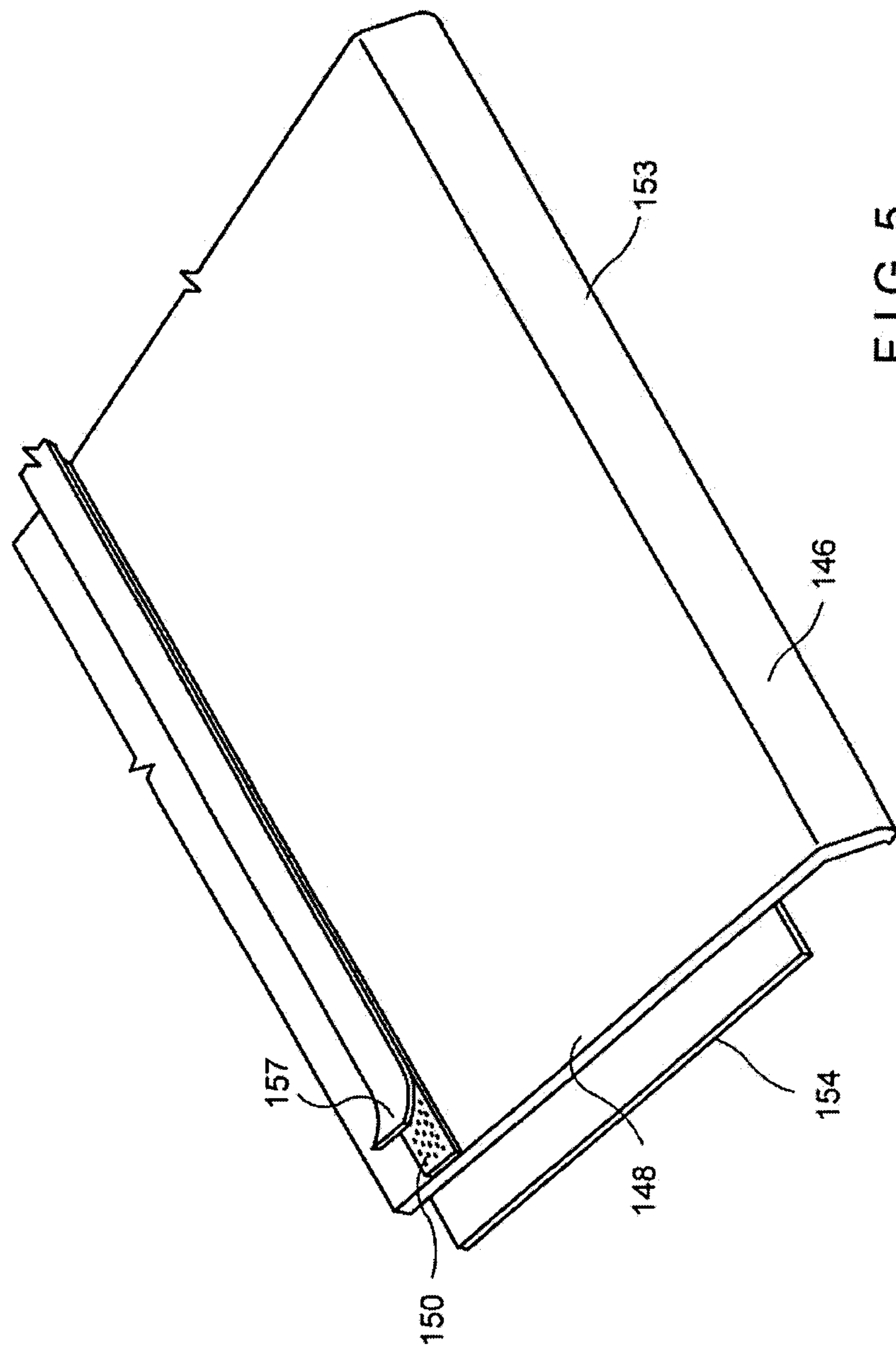


FIG. 5

