



US 20060191208A1

(19) **United States**

(12) **Patent Application Publication**
MacIntyre

(10) **Pub. No.: US 2006/0191208 A1**

(43) **Pub. Date: Aug. 31, 2006**

(54) **CUSTOMIZABLE DRAIN GUARD**

Publication Classification

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(51) **Int. Cl.**
E04D 13/00 (2006.01)

(52) **U.S. Cl.** **52/12**

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(57) **ABSTRACT**

A perforated drain guard for blocking debris while allowing liquid flow from a channel into a drain is disclosed. The drain guard includes a central portion and rotatable and removeable sloped wings permitting customization for varying channel shapes. Optimal materials, adhesives, sizes, and methods of manufacture and installation are also disclosed. The drain guard is customized during installation and may be adhered in place to the channel.

(21) Appl. No.: **11/069,123**

(22) Filed: **Feb. 28, 2005**

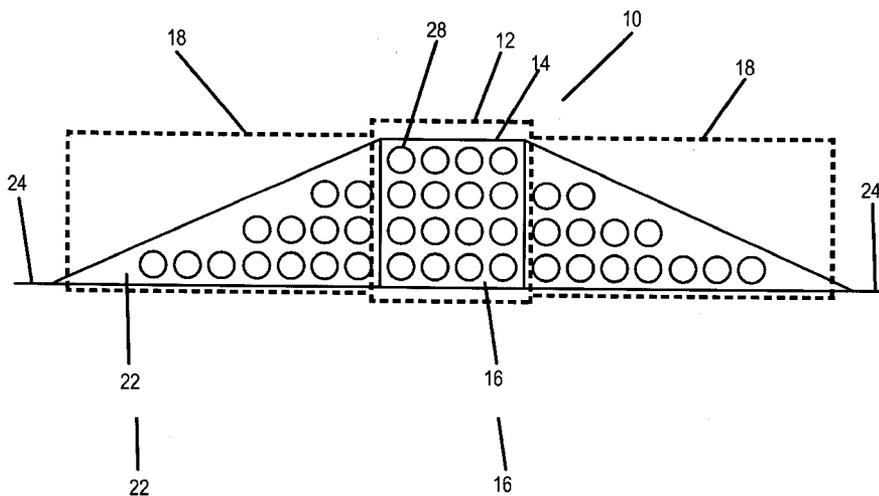
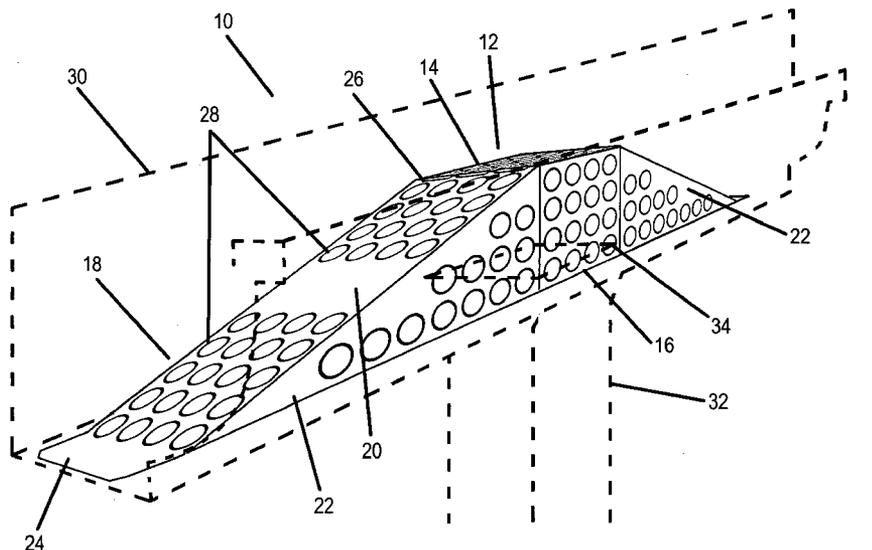


Fig.1

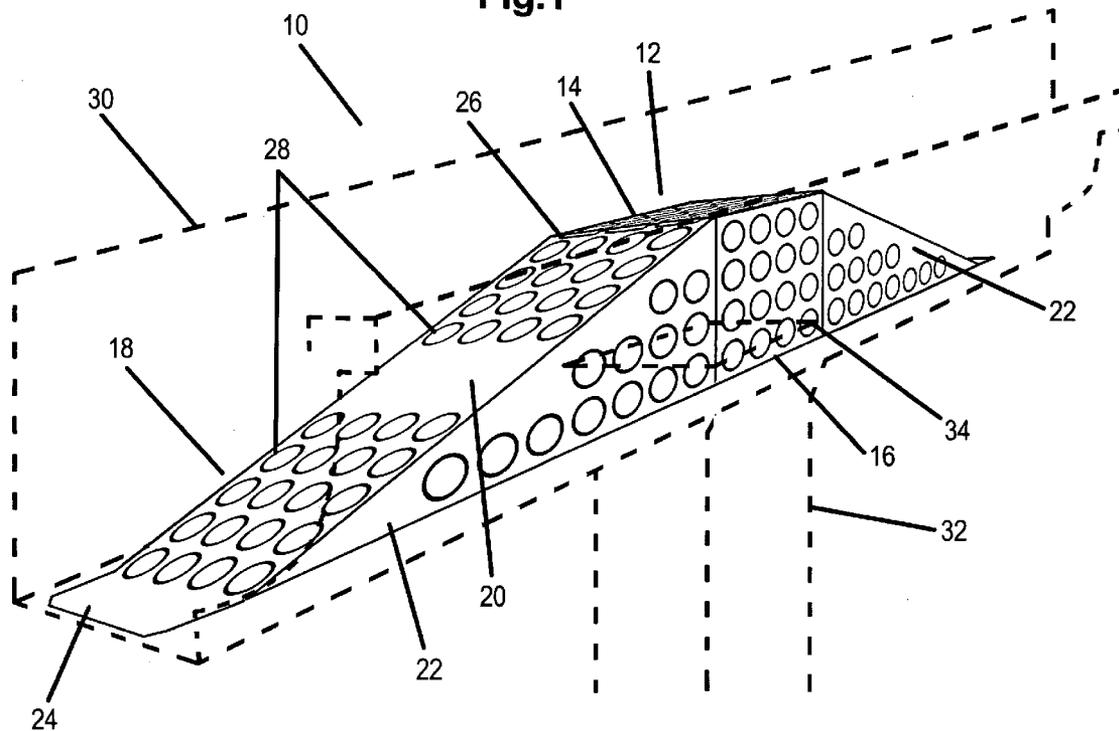


Fig.2

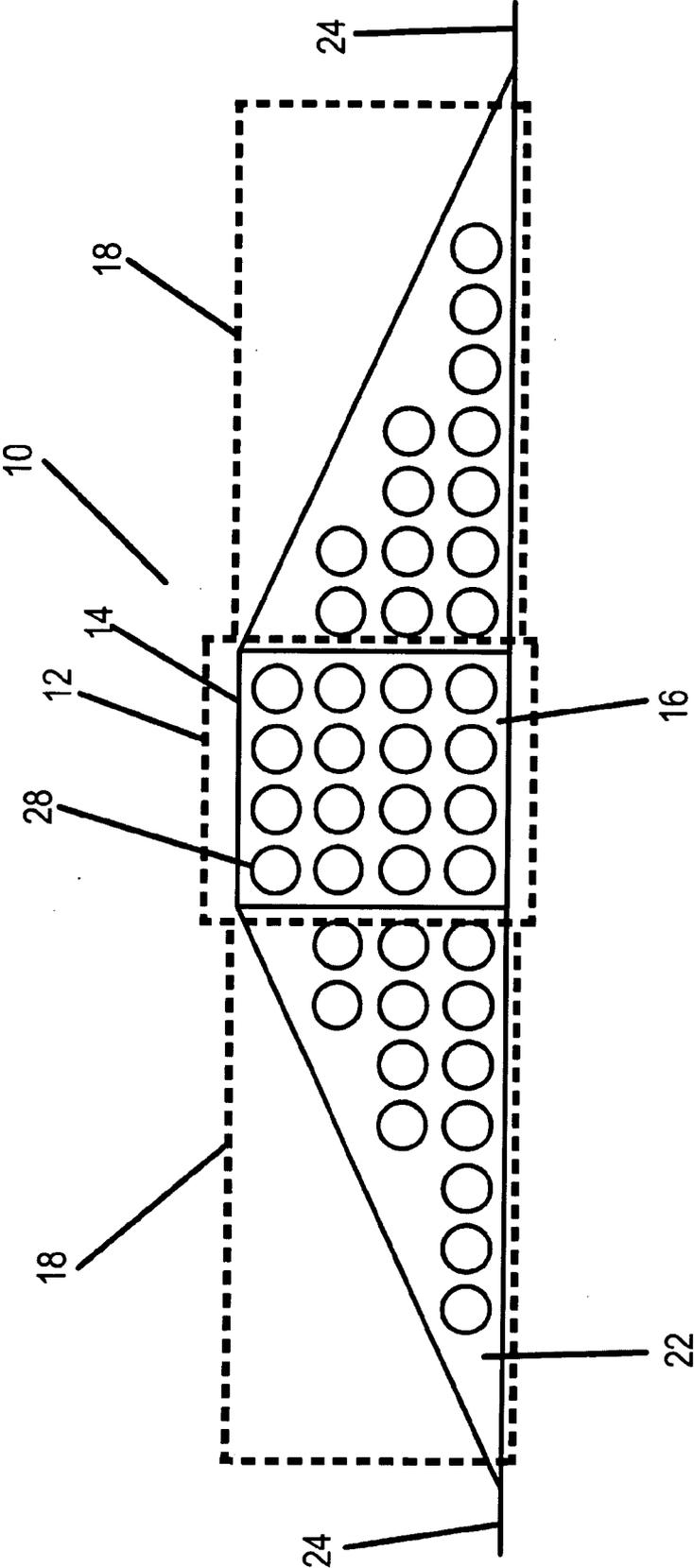


Fig.3

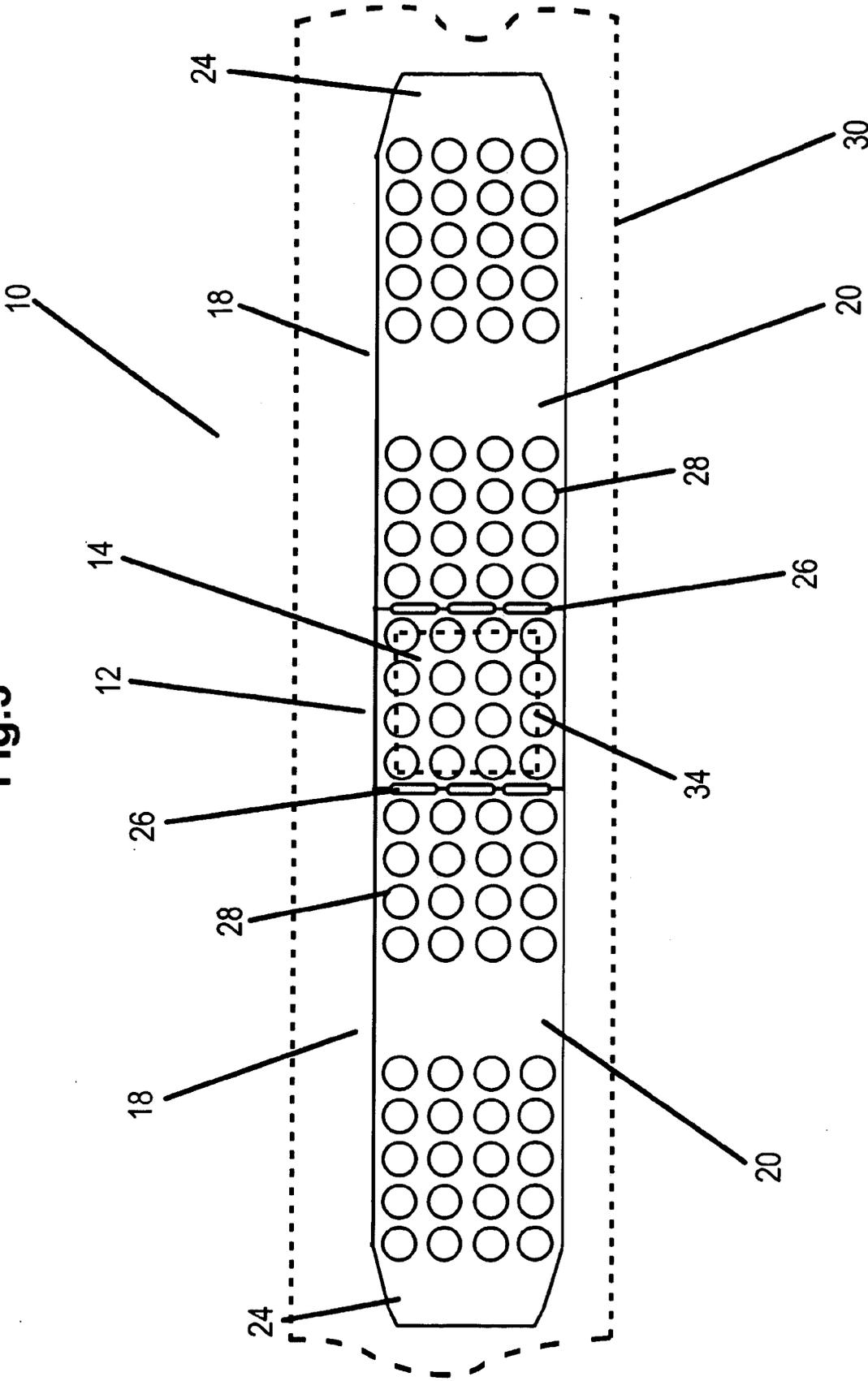
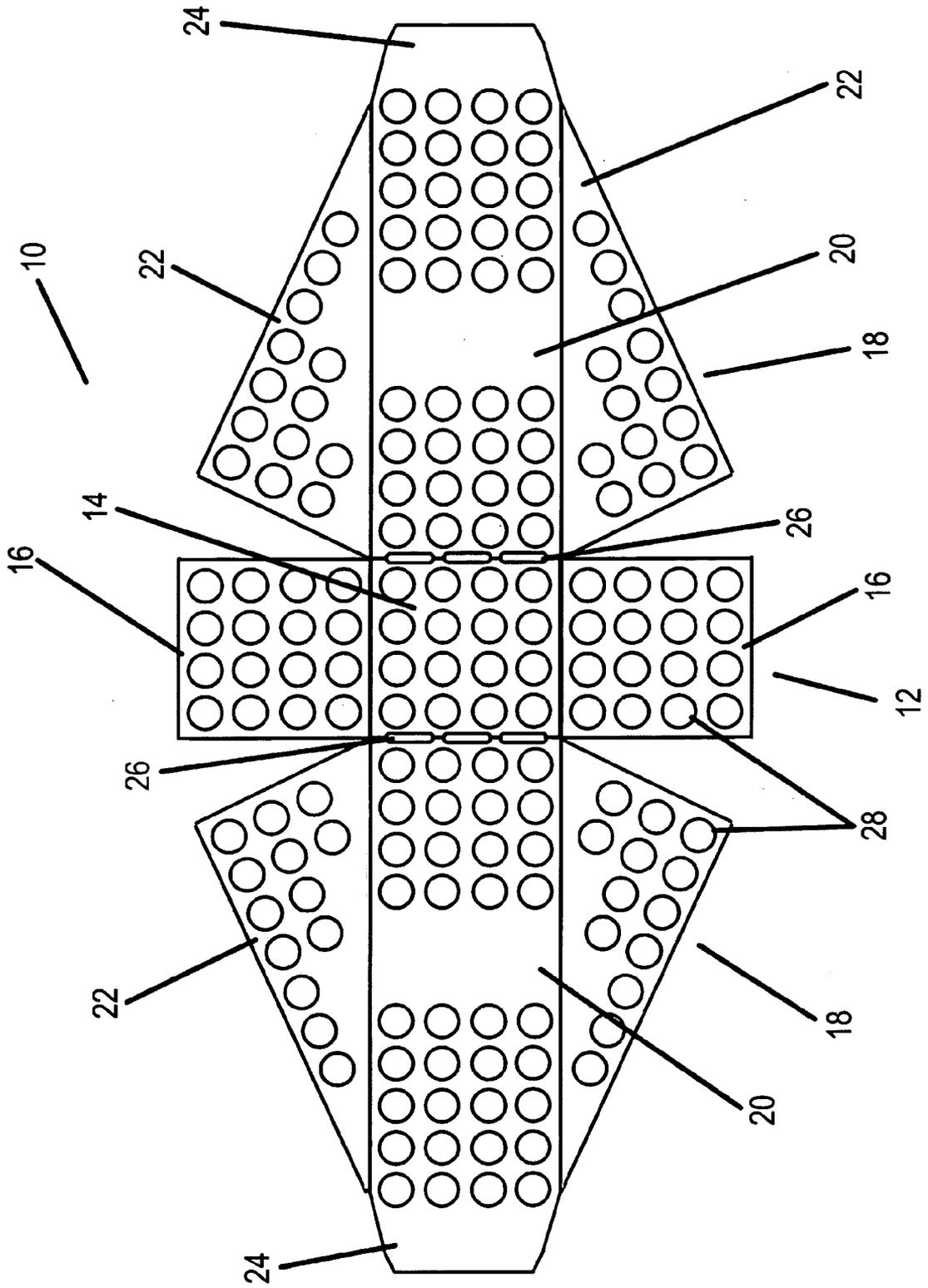


Fig.4



CUSTOMIZABLE DRAIN GUARD

1. TECHNICAL FIELD

[0001] The present invention relates to drain guards for use in gutters to prevent clogging of the gutters and downspouts. In particular, a gutter drain spout guard with a box-shaped central portion and two rotatable and detachable sloping wings is disclosed. The drain guard is modular, customizable and easy to manufacture and install and minimizes gutter maintenance.

2. BACKGROUND OF THE INVENTION

[0002] Drains and gutters are used to channel the flow of excess water from buildings thereby avoiding water damage. The roofs of houses and buildings commonly incorporate rain gutters or eaves troughs that collect and redirect rain-water.

[0003] Water flow through the downspouts often contains large particles or debris such as foliage and sediment which will block or restrict drainage if it is not removed. Damage may then occur not only to the gutter system, but to the building structure itself.

[0004] Many devices have been developed to reduce clogging of gutter systems by attempting to filter out debris, preventing it from entering and blocking the downspout yet, allowing water to pass uninterrupted through the filter.

[0005] For example, U.S. Pat. No. 5,242,591 (“’591”) issued to Beechert consists of wire-mesh sheets folded into elongated boxes which are placed in open drains, shielding the drain from leaves and other debris. The box design of the ’591 Patent is awkward to install as the entire drain must be filled with the mesh boxing. The cost of installation is, therefore, high and the boxing must be customized to fit around obstacles such as supports and corners.

[0006] U.S. Pat. No. 2,875,712 (“’712”) issued to Blau shows a downspout shield that is hinged and held in place at the corner of the eaves trough. It has an additional anti-clogging device placed under the shield above the downspout. The ’712 Patent is complex in construction, including the hinge system, attachment means and separate anti-clogging device required, further rendering the device difficult to install. The ’712 Patent does not appear to protect a downspout that is situated in the middle of a length of gutter. Additionally, both the ’591 and ’712 Patents are suitable for “U” shaped gutters only, which are currently extremely rare in North America.

[0007] U.S. Pat. No. 5,409,602 (“’602”) to Sorenson discloses an inverted U-shaped drain guard with slots for use in a conventional flat bottomed gutter system. The ’602 device is difficult to manufacture, fits only a single drain size, is not customizable and inefficient at straining, and not suitable for downspouts at an end of a gutter, as if designed for downspouts with gutter floor space on each side of the drain hole.

[0008] The present invention satisfies the need for an easy and economical device to manufacture and install which optimizes water flow therethrough while blocking debris, and is customizable to fit varying gutter designs.

3. SUMMARY OF THE INVENTION

[0009] A perforated drain guard adapted to stop debris from passing therethrough, while permitting the passage of

fluid, comprised of an inverted U-shape central portion having a top and two sides and at least one inverted U-shaped, sloped central wing projecting from the central portion, with a plurality of openings, is disclosed.

[0010] The wings are removeably attached to the central portion at a single edge, permitting easy customization by snapping off the modular wing where it is not required, for instance in a channel with a vertical wall adjacent to a drain hole. The drain guard may also have a tang at the foot of each wing to provide a stable base and attachment point between the drain guard and the floor of the channel or gutter. The drain guard is held in place by its own weight. The wings include a solid portion which channels debris sideways and off the drain guard.

[0011] A method of installation is disclosed whereby the wings of the drain guard are rotated downwards if the gutter floor around the drain hole is raised. Caulking or other adhesives maybe applied to the bottom edges of the drain guard and the underside of the tangs. The drain guard is placed in the gutter with the central portion directly over the drain hole.

[0012] A method of manufacturing a drain guard is also disclosed wherein a flat drain guard blank is punched out, preferably of 24 gauge stainless steel, including the distinct central and wing segments and a plurality of openings therethrough. The two sides of the central portion are bent downwards at substantially 90° in relation to the flat central portion, and the two flaps of the wing portions are bent downwards at substantially 90° to the flat wing portion.

4. BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The apparatus and method of the present invention will now be described with reference to the accompanying drawing figures, in which:

[0014] **FIG. 1** is a perspective view of the drain guard installed in a conventional gutter over a drain hole, according to the invention.

[0015] **FIG. 2** is an elevation view of a drain guard, according to the invention.

[0016] **FIG. 3** is a plan view of a drain guard in a conventional gutter, according to the invention.

[0017] **FIG. 4** is a plan view of a stamped out drain guard sheet during manufacture, according to the invention.

5. DETAILED DESCRIPTION OF THE INVENTION

[0018] Maintaining gutters and down pipes free from debris is a constant building maintenance challenge. The present invention provides an economical, easy to manufacture solution in the form of a modular, customizable and easy to install drain guard **10**. Referring to **FIG. 1**, a perspective view of the drain guard **10** installed in a conventional gutter **30** (dotted outline) over a drain hole **34** is shown. The drain guard **10** in assembled form is an elongated hollow structure comprised of three segmented components. The underside of the drain guard **10** is open. While the preferred embodiment is described in terms of a drain guard **10** in a gutter **30**, it should be appreciated that the drain guard may be used in any channel for liquid having a drain.

[0019] The central portion or box **12** of the drain guard **10** is generally cube shaped, formed by an inverted U-shape with an open base. The top **14** of the box **12** is substantially a square panel with four edges, a front and back edge and two side edges. In the preferred embodiment, a square side panel **16** projects downwards from each of the two side edges of the top **14** of the box **12**. A hollow wing **18** is rotatably attached to both the front and back edges of the top panel **14**. The wing **18**, attached to the front edge of the top panel **14**, is attached via a row of perforations **26** so that it can be easily detached during customization to a particular channel structure. In a variation, both edges of the top **14** of the box **12** to which a wing **18** is attached are perforated. Each wing comprises an angled top **20** which slopes down and away from the top panel **14** of the box **12** to the base at an angle below horizontal. A substantially triangular flap **22** projects downwards and preferably substantially vertically and at 90° from the left and right sides of the top panel **20** of the wing **18**. A tang **24** projects from the front or distal edge of each wing **18** such that, in the preferred embodiment, the tang **24** lies horizontal and parallel to the top **14** of the box **12**. The bottom edges of the side panels **16** of the box **12**, the flaps **22** and the tang **24** all lie, before customization, on the same horizontal plane. The back edge of the top **20** of the wing **18** is attached to the top panel **14** of the box **12**. The top panel **14** of the box **12**, top panels **20** of the wing **18**, side panels **16** and flaps **22** are all perforated with a plurality of holes **28**. Preferably the perforations or holes **28** are circular and between 5 mm and 15 mm in diameter. The optimal hole **28** size has been found to be 9.53 mm ($\frac{3}{8}$ ""). The optimal hole **28** size is the size most effective for blocking or filtering debris while permitting maximal water flow through the drain guard **10**. In variations, other hole **28** diameters may be employed.

[0020] The tangs **24** at the end of each wing **18** are tapered, such that the edge of the tang **24** abutting the edge of the wing **18** is wider than the distal edge of the tang **24**. This assists in directing sludge in the gutter **30** moving to the sides of the drain guard **10** rather than up and through the holes **28**.

[0021] Conventional gutters **30** are typically flat bottomed and of standard dimensions. The optimal drain guard **10** dimensions for use in conventional gutters **30** are 343 mm (13.5") long by 57.2 mm (2.25") wide by 57.2 mm (2.25") high. The dimensions, as can be appreciated by one skilled in the art, are dependent on the gutter **30** size, and accordingly the invention **10** can be scaled up or down to suit different channel designs. In variations where the drain is of a large size, for instance in industrial applications, the drain guard **10** is of a size sufficient to cover the drain hole **34**. The present invention can be installed in a wide range of gutter **30** sizes as it is of lesser dimensions than gutter **30** and is placed over the drain hole **34** regardless of the location of the side walls of the gutter **30**.

[0022] The drain guard **10** design allows for debris to be swept from the roof into the gutter rather than piling on the roof or falling below, often onto paths, as with conventional drain guards. The debris can then be removed from the gutters during maintenance. The drain guard **10** is narrower than the gutter **30**, thereby permitting debris and sludge to pass along the sides of the guard **10** while not blocking water flow. Debris moves up the sloped wings **18** and fall to the

sides of the guard **10**, unlike known drain guards which are of the same width as the gutter **30**.

[0023] The drain guard is optimally comprised of 24 gauge stainless steel, such that it is lightweight, and cheap and easy to manufacture and install. Other materials such as plastic or other substitutes may be used in variations, however.

[0024] In variations, the central portion **12** and wings **18** may be of other shapes and contours, such as curved, parabolic, and cylindrical. The sloping ramp structure of the wing **18** of the preferred embodiment is optimal.

[0025] FIG. 2 is an elevation view of the drain guard **10** with dotted lines around the wing **18** and box **12** sections of the drain guard **10**.

[0026] Installation is straightforward and can be performed by home owners or maintenance workers. Referring now to FIG. 3, a plan view of the drain guard **10** installed in a conventional gutter **30** is shown. During installation, the down pipe **32** placement in relation to the gutter **30** must be evaluated by the installer. The drain guard **10** can be customized to fit many variations of gutter **30** and down pipe **32** design. Some examples of customization follow but are not intended to be limiting. If the gutter **30** is continuous on each side of the drain hole **34** at the mouth of the down pipe **32**, the full drain guard **10** unit is placed open side down in the gutter **30**.

[0027] The drain guard **10** is held in place in the gutter **30** by its own weight. With the wings **18** rotated inwards, the tangs **24** grip the gutter **30**. The plastic insert (not shown) typically installed in the drain hole **34** also acts to secure the drain guard **10** as the box **12** abuts the plastic insert (the sides of the box **12** can be squeezed in for a snug fit against the insert). An adhesive may, optionally, be placed on the underside of each tang **24**, and the bottom edges of the drain guard **10**. The drain guard **10** in place over the drain hole **34** without adhesive, however. The adhesive is optimally caulking, but other adhesives may be used, or any bonding agent suitable for the material of a particular drain guard **10** and gutter **30**.

[0028] If one side of the gutter **30** adjacent to the drain hole **34** is discontinuous, typically at the end of the gutter **30** where it is capped by a vertical wall at the corner of a building, the installer simply bends one wing **18** of the drain guard **10** back and forth. The wing **18** naturally hinges at the perforated edge **26** of the top panel **20**, and the perforated joint quickly breaks due to metal fatigue, without the use of tools. The drain guard **10** is then installed, again optionally with adhesive on the open edges of the box **12** abutting the end gutter wall (not shown), and underneath the remaining tang **24** on the wing **18** projecting away from the gutter **30** wall. The box **12** is located over the drain hole **34**. The second wing **18** is not required, in this case, as water and debris will only approach the drain hole **34** from the continuous side of the gutter **30**.

[0029] If the bottom of the gutter **30** is angled adjacent to the drain hole **34**, the drain guard **10** is bent slightly so that its underside is contiguous with the gutter **30**.

[0030] It is often the case that the gutter **30** bottom is raised immediately adjacent to the drain hole **34**, either with caulking or a plastic insert. Conventional drain guards do not

address this issue, leaving a gap through which debris can enter the downpipe 32. The present invention, however, is easily installed by bending the flaps 22 of each wing 18 slightly towards the middle or center line of the drain guard 10 so that they can pass by the sides 16 of the box 12. Both wings 18 are then rotated about the joint with the top 14 of the box 12 and inward, so that the flaps 22 slightly overlap the sides 16 of the box 12. The box 12 is thereby slightly raised in relation to the wings 18, and seats against the raised portion of the gutter 30 floor with the bottom of the wings 18 substantially flush with the gutter 30 floor as well. In this manner, the drain guard is customized for the particular gutter 30 design and effectively blocks debris.

[0031] The drain guard 10 easily slides under the transverse gutter 30 supports or brackets (not shown) commonly used to retain the gutter 30 against the building. It is significant that the box 12 is always located immediately above the drain hole 34. As the top 14 of the box 12 is the highest point of the drain guard 10, it performs most effectively by tenting debris with an apex over the drain hole 34, thereby maximizing water flow from the gutter 30 into the drain hole 34.

[0032] Furthermore, the flexible nature of the drain guard 10 permits the installer to bend the drain guard 10 to conform to particular characteristics of the gutter 30 or channel. The sides 16 and flaps 22 may be bent to any angle in relation to the top of the drain guard 10, from 0° to 135°, and from straight to convex or concave.

[0033] In use, the holes 28 in the drain guard 10 are sized to permit the passage of a small amount of grit, dirt and debris such as decayed leaves to pass with water through the guard and down the down pipe 32. Larger size debris such as leaves, twigs, soil and moss cannot pass through the holes 28. Additionally, the combination of the central box 12 with the sloped wings 18 allows substantial debris to tent up over the gradually sloped drain guard 10 with little effect to the water flow through the drain guard 10. The top surface 20 of each wing 18 also comprises a central area which is solid (without perforations or holes 28). The solid area acts as a guide for dirt and debris. As debris accumulates at the base of the drain guard 10 and begins sliding up the wing 18, the lower holes 28 may be partially obscured. When the debris reaches the solid section of the top surface 20 of the wing 18, it is channeled sideways or laterally and falls off the wing 18 in to the gutter 30. In this manner, the holes 28 on the upper portion of the top surface 20 of the wing 18 is maintained free of debris. Conventional drain guards, while attempting to filter, do not have such an optimal shape. The drain guard 10 is quickly and easily modified in the field to fit a wide range of gutter 30 and down pipe 32 configurations. Continual maintenance, is however, recommended.

[0034] The drain guard 10 is also advantageously designed for manufacture. Referring now to FIG. 4, the drain guard 10 is shown during manufacture before assembly. The guard 10 is comprised of a single piece of metal, and can be machine stamped or even cut by hand with tin snips. The holes 28 and perforations 26 are also stamped into the single horizontal sheet of metal. Once stamped, as shown in FIG. 4, the sides 16 of the box 12 and the flaps 22 of the wings 18 are bent, optimally at 90° below horizontal. The leading or front edges of the top 20 of the wings 18 are bent such that tangs 24 are formed which are coplanar to the top 14 of the box 12. This single piece construction can be quickly and economically produced.

[0035] As will be apparent to those skilled in the art, in light of the foregoing disclosure, many alterations and modifications are possible in the practice of this invention without departing from the spirit or scope thereof. Accordingly, the scope of the invention is to be construed in accordance with the substance defined by the following claims.

What is claimed is:

1. A perforated drain guard adapted to stop debris from passing therethrough while permitting the passage of fluid, comprised of:

- a) a central, hollow, inverted substantially U-shaped section;
 - b) at least one hollow wing with a top surface projecting at an angle below horizontal from the top of said central section and two sides projecting downwards from said top of said wing.
2. The drain guard of claim 1 wherein said central section is comprised of three substantially square faces, namely a top and two sides, said sides projecting downwards from said top at substantially 90°.
3. The drain guard of claim 1 wherein said wing is comprised of three substantially planar faces, namely a top and two sides, said sides projecting downwards from said top at substantially 90°.
4. The drain guard of claim 3 further comprising a tang projecting from an outer edge of said wing.
5. The drain guard of claim 4 wherein said tang is tapered inward towards a distal edge of said tang and said tang is parallel to a top of said central section.
6. The drain guard of claim 1 wherein said perforations are holes between 5 mm and 15 mm in diameter, thereby permitting liquid flow while blocking the passage of debris.
7. The drain guard of claim 6 wherein said holes are 9.5 mm (3/8") in diameter, said diameter being optimal for blocking debris while permitting liquid flow.
8. The drain guard of claim 1 wherein said wing is attached to said central section by a sole contiguous edge, thereby permitting rotation of said wing about said central section.
9. The drain guard of claim 8 wherein said contiguous edge comprises perforations along said edge such that said drain guard easily separates along said edge for installation against a vertical wall of a channel.
10. The drain guard of claim 1 wherein said drain guard is comprised of stainless steel.
11. The drain guard of claim 10 wherein said stainless steel is 24 gauge stainless steel.
12. A drain guard for use in a channel for fluids, said drain guard comprised of an inverted, substantially U-shaped central segment having a top and two sides on inverted, substantially U-shaped, sloped ramp segment projecting from each of two ends of said central segment with a plurality of openings being disposed in said drain guard.
13. The drain guard of claim 12 wherein said ramp segments are removeably attached to said central segment.
14. The drain guard of claim 12 wherein said ramp segments are rotatable about the said edges such that said ramp segments can be lowered in relation to said central segment for installation about a drain, the lip of which is raised in relation to the bottom of said channel.
15. The drain guard of claim 12 wherein a top surface of at least one ramp segment comprises a solid area with said

openings disposed below said solid area, such that in operation, debris flows across said solid area and off the sides of said ramps, thereby maintaining openings free of debris.

16. A method of manufacturing a drain guard consisting of a central substantially cube shaped portion and at least one sloped wing by punching out a flat drain guard blank with distinct central and wing segments and a plurality of openings therethrough.

17. The method of claim 16 further comprising the subsequent steps of:

- a) bending two sides of said central portion downwards at substantially 90° to said flat central portion; and
- b) bending two flaps of said wing portions downwards at substantially 90° to said flat wing portion.

18. The method of claim 16 further comprising the step of:

- c) bending the distal ends of said wings such that a tang is formed on each said wing which is parallel to said flat central portion.

19. A method of installing a drain guard having a central cube portion with at least one rotatably and removeably attached ramp portion and a plurality of openings over a drain hole in a channel comprising the steps of:

- a) rotating said ramps such that the base of each said ramp is flush with a floor of said channel; and
- b) placing said drain guard in said channel over said drain hole.

20. The method of claim 17 further comprising the step of applying adhesive to at least one of the bottom edges of said ramp, the bottom edges of said cube portion and the underneath of a tang at the end of each said ramp after step (a).

21. The method of claim 17 wherein when said drain hole is adjacent to a wall of said channel, the additional step of detaching a ramp from said cube is performed before step (a), such that a side of said cube abuts said wall.

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