DEBRIS COLLECTION DEVICE FOR A GUTTER DOWNSPOUT

Inventor: Patrick J. Bessette, Shorewood, IL (US)

Correspondence Address:
CHERSKOV & FLAYNIK
SUITE 1447
20 NORTH WACKER DR.
CHICAGO, IL 60606 (US)

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ABSTRACT

A debris collection device 10 for a gutter downspout 21 includes a transparent enclosure 12 having an inlet 16 and outlet 18 that are configured to snugly insert into corresponding portions of the gutter downspout 21. A cylindrically configured debris collection screen 60 is removably installed in the enclosure 12 via a lid 48 in a cover 46 over a vertically positioned aperture 34 in the enclosure 12. The debris collection screen 60 is deformable and resilient to provide a debris collection member capable of "flattening" as more debris 65 is captured by the screen 60 thereby allowing unobstructed water flow through the enclosure 12. The transparent enclosure 12, debris collection screen 60 and lid 48 cooperate to allow an individual access to the screen 60 for removing captured debris 65 from the screen 60 without removing the screen 60 from the enclosure 12. An outlet screen 58 is installed over the enclosure outlet 18 to collect debris 65 that might flow around the debris collection screen 60 during heavy rainfall. An individual may remove debris 65 collected by the outlet screen 58 while the collection screen 60 remains in the enclosure 12 by forcibly adjusting the position of the deformable collection screen 60 to provide hand space.
Fig. 5
Fig. 6
DEBRIS COLLECTION DEVICE FOR A GUTTER DOWNSPOUT

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

The present invention relates generally to gutter downsputs and, more particularly, to debris collection devices that integrally insert in the gutter downsput to remove debris carried by water flowing through the gutter system.

[0002] 2. Background of the Prior Art

Gutter downsputs on some homes are connected to drain lines which in turn are ultimately tied to sewers via footer drain lines. Tree leaves and small pieces of roofing carried by rainwater through the gutter system, may accumulate and “plug” the footer drain lines resulting in water entering the homes basement. Debris traps inserted in gutter downsputs at an elevation accessible by an individual for cleaning, are devices often used to capture foreign material carried by rainwater.

[0003] Prior art debris trap devices utilize a screen that inserts into a housing. Examples of this technique is disclosed in U.S. Pat. Nos. 5,385,158 and 4,798,028. These patents teach the use of screens that are configured substantially the same as and slightly smaller in dimension than a housing that removably receives the screens. Further, the screens must be removed from the housing for cleaning.

[0004] One problem with this method of debris collection, is a relatively small cross sectional area through which water flows after the screen captures a sufficient quantity of debris to cover a bottom portion of the screen. The water flow engages the debris covered bottom portion, then is directed through the side walls of the screen; whereupon, the water must flow through the gap between the screen and housing walls. This method can cause the water to backup into the downsput during heavy rainfall.

[0005] Another problem with this method of debris collection, is that the screen must be removed from the housing for cleaning. When the screen is full, the trap must be lifted from the housing and the captured debris discarded. When the quantity of captured debris is greater than the volume of the trap, removing the screen allows any excess debris to fall through the housing outlet.

[0006] Still another problem with this method of debris collection, is that the walls of the housing and collection screen prevent an individual from visually determining the quantity of debris collected by the screen to ascertain if cleaning is required. Special indicators must be built into the screen to display when the screen needs to be emptied.

[0007] A need exists for a debris collection device that does not impede water flow irrespective of the quantity of captured debris in the debris collection screen. Further, a need exists for a debris collection device that allows an individual access to the debris collection screen to remove captured debris from the screen while the screen remains inside the housing. Finally, a need exists for a debris collection device that allows an individual to determine the quantity of captured debris by visually inspecting a transparent housing and collection screen therein.

SUMMARY OF THE INVENTION

[0010] It is an object of the present invention to provide a debris collection device for a gutter downsput to overcome may of the disadvantages of the prior art.

[0011] A principal object of the present invention is to provide a device that removes debris from water flowing through a gutter downsput. A feature of the device is an enclosure lid that pivotally opens to allow access to a debris collection screen. An advantage of the device is that the debris collection screen may cleaned without being removed from the enclosure. Another advantage resulting from the debris collection screen being cleaned in the enclosure, is that no debris passes through the enclosure which could occur should the screen be removed for cleaning.

[0012] Another object of the present invention is to provide a device that utilizes a deformable and resilient debris collection screen to collect debris entering the enclosure. A feature of the device is a debris collection screen that collapses to form an arcuate debris collection portion that concentrates the collected debris in a center portion of the collection screen. An advantage of the device is that water flows unobstructed through a perimeter portion of the debris collection screen and through the outlet of the enclosure.

[0013] Yet another object of the present invention is to provide a device that is easily cleaned. A feature of the device is a collapsed upper portion of the debris collection screen being positioned at the proximate mid-portion of the lid. An advantage of the device is that an individual has easy access to the debris collected by the collection screen to remove the debris from the enclosure.

[0014] Still another object of the present invention is to provide a device that includes a debris collection screen with an alternative non-deformable design. A feature of the device is an arcuately configured debris collecting upper portion of the screen that forces debris into a center portion of the archuate configuration. An advantage of the device is that the contoured perimeter of the upper portion remains free of debris to pass water therethrough while the center portion maintains the collected debris at a concentrated position easily accessible by an individual for cleaning.

[0015] A further object of the present invention is to provide a device that utilizes a second screen over the outlet of the enclosure. A feature of the device is an outlet screen having apertures relatively larger than the apertures of the debris collection screen. An advantage of the device is that debris that flows around the debris collection screen is captured, while water is allowed to flow unobstructed through the outlet screen.

[0016] Another object of the present invention is to provide a device that allows an individual to determine the quantity of captured debris by viewing the exterior of the enclosure. A feature of the device is a transparent enclosure. Another feature is a screen configuration that does not interfere with an individual’s view of the debris collected in the screen when the individual views an aperture cover. An advantage of the device is that the enclosure need not be opened nor special indicators be employed to ascertain the quantity of debris captured by the screen.

[0017] Briefly, the invention provides a gutter downsput debris collection device comprising an enclosure having an
inlet and outlet configured to integrally join to a gutter downspout; a debris collection screen inserted in said enclosure; means for removing the debris from said debris collection screen without removing said debris collection screen from said enclosure; and an outlet screen positioned to prevent debris from falling through said enclosure outlet when removing the debris from said debris collection screen.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] The foregoing invention and its advantages may be readily appreciated from the following detailed description of the preferred embodiment, when read in conjunction with the accompanying drawings in which:

[0019] FIG. 1 is a perspective view of a gutter downspout debris collection device installed in a predetermined portion of a gutter downspout with a cutout portion of the downspout depicted adjacent to the device in accordance with the present invention.

[0020] FIG. 2 is an exploded view of the device of FIG. 1 in accordance with the present invention.

[0021] FIG. 3 is a front elevation view of the device of FIG. 1 with a lid in a closed position.

[0022] FIG. 4 is a side elevation view of the device of FIG. 3.

[0023] FIG. 5 is a front elevation view of the device of FIG. 3 with the lid in an open position.

[0024] FIG. 6 is a front elevation view of the device of FIG. 5 with debris collected by a “flattened” debris collection screen member.

[0025] FIG. 7 is a perspective view of an alternative embodiment of a debris collection screen member of the device in accordance with the present invention.

[0026] FIG. 8 is a front elevation view of a second alternative embodiment of a debris collection screen member of the device in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0027] Referring now to the drawings and in particular to FIGS. 1-5, perspective, exploded, front and side views of a gutter downspout debris collection device in accordance with the present invention is denoted by numeral 10. The debris collection device 10 includes a transparent, substantially cubic configured enclosure 12 or housing having a defined cavity 14 therein and an inlet 16 and outlet 18 integrally joined to the outer periphery of the enclosure 12. The enclosure inlet and outlet 16 and 18 are made a part of the enclosure through an injection molding process or by securing discreet “gutter-like” components to opposing top and bottom walls 25 and 26 of the enclosure 12 by using glue or stainless steel screws 17 after cutting vertically aligned inlet and outlet apertures 19 and 23 in the corresponding top and bottom walls 25 and 26. The enclosure inlet 16 is configured to allow an upper portion 20 of the gutter downspout 21 to snugly insert inside the inlet 16. The enclosure outlet 18 is configured to snugly insert into a lower portion 22 of the downspout 21. The described positioning of the inlet and outlet 16 and 18 in relation to the upper and lower portions 20 and 22 prevents a generally downward flow of water from escaping the downspout 21 when engaging the device 10.

[0028] The longitudinal dimension of the inlet 16 is relatively longer than the longitudinal dimension of the outlet 18 to allow the device 10 to replace a cutout portion 24 of the gutter downspout 21. Thus, after removing a predetermined portion 24 of the gutter downspout 21, the upper portion 20 of the downspout 21 is inserted in the inlet 16 of the device 10, then the device 10 is elevated until the top wall 25 of the enclosure 12 engages a lower edge 27 of the upper portion 20 of the downspout 21. The longitudinally shorter outlet 18 of the device 10 allows the outlet 18 to be positioned above the lower portion 22 of the downspout 21; whereupon, the device 10 is lowered until a bottom wall 26 of the enclosure 12 engages an upper edge 28 of the lower portion 22 of the downspout 21. The longer inlet 16 maintains the upper portion 20 of the downspout 21 inside the inlet 16 when the bottom wall 26 of engages the upper edge 28 of the lower portion 22 thereby maintaining the position of the device 10 relative to the gutter downspout 21.

[0029] The enclosure 12 includes a front wall 30 having a cylindrical extension 32 integrally joined thereto that defines an aperture 34 that provides access to the enclosure cavity 14. The extension 32 includes inner and outer cylindrical walls 36 and 38 that define an annular rim 40 that is forcibly inserted and secured into a corresponding recess 42 in a lower portion 44 of a watertight cover 46 that covers the aperture 34. An alternative to the forcible insertion of the rim 40 into the recess 42, is an external thread 45 positioned upon the outer cylindrical wall 38 of the extension 32. The external thread 45 snugly engages a cooperating internal thread 47 on an inner cylindrical wall 52 in the lower portion 44 of the watertight cover 46. The cooperating external and internal threads 45 and 47 compress the gasket 50 thereby maintaining the watertight seal between the gasket 50 and the walls 38 and 52 engaging the gasket 50.

[0030] A selected cover 46 is manufactured by FloTool International, a corporation in Tustin, Calif.; the cover is disclosed in U.S. Pat. No. 5,320,323. The cover 46 includes a lid or flap 48 made watertight by a gasket 50 secured to an inner wall 52 of the cover 46. The lid 48 includes a hinge 54 that pivotally joins the lid 48 to the cover 46 thereby allowing the lid 48 to be pivoted to a non-obtrusive position when access to the cavity 14 of the enclosure 12 is required for removing debris. The lid 48 further includes a latch 56 that maintains the lid 48 in a watertight closed position when the device 10 is in operation.

[0031] The enclosure 12 has a relatively rigid outlet screen 58 covering the outlet aperture 23 in the bottom wall 26. The outlet screen 58 includes rhomboid configured apertures 57 with each side 59 measuring substantially about one-half inch in length. The outlet screen 58 maintains the position of a lower portion of a debris collection screen 60, and prevents debris 65 from passing or falling through the enclosure outlet 18 when debris is removed from the debris collection screen 60 or when an excessive amount of debris accumulates in the enclosure 12 causing some debris to escape the collection screen 60.

[0032] The debris collection screen 60 is cylindrically configured and has substantially square apertures 61 throughout with each side 63 of the aperture measuring sub-
stantially about three-eighths inch in length. The collection screen 60 may be fabricated from a myriad of deformable, yet resilient materials such as plastic or nylon. The screen 60 includes an axial dimension that extends the screen 60 from an inner bottom wall 62 of the enclosure 12 to a position adjacent to the gasket 50. The screen 60 further includes a diameter substantially equal to the diameter of the gasket 50; the diameter and axial dimension of the screen 60 cooperate to position the screen 60 in the cavity 14 of the enclosure 12 such that any debris entering the enclosure cavity 14 via the inlet 16 will engage the screen 60. The screen 60 being fabricated from plastic or nylon, allows the screen 60 to be positioned in a deformed configuration that corresponds to the quantity of debris collected by the screen 60 as water flows through the enclosure 12. The screen 60 is ultimately “flattened” into a relatively concave or arcuate configuration after the enclosure 12 becomes filled with collected debris removed by the screen 60 from the flowing water through the gutter downspout 21; the concave or arcuate configuration promoting continuous water drainage from the enclosure 12 irrespective of the quantity of debris collected, and allowing an individual access to collected debris to remove the debris from the enclosure without removing the debris collection screen 60.

[0033] In operation, a predetermined portion 24 is cut from a gutter downspout 21 that routes rainwater from the roof gutters of a building to ground elevation. A gutter downspout debris collection device 10 is positioned in the gap formed by the removal of the predetermined portion 24 from the gutter downspout 21. The device 10 is vertically positioned at an elevation above grade that allows an individual to lower a lid 48 portion of a cover 46 over an aperture 34 in the enclosure 12 thereby gaining access to a cavity 14 to remove debris 65 collected by a screen 60 that fills a substantial portion of the cavity 14. Initially, a clean cylindrical debris collection screen 60 is installed in the enclosure 12 such that debris engages and adheres to an upper portion of the screen 60. Due to the curvature of the screen 60, some of the debris 65 flows around the screen 60 and is ultimately collected by the outlet screen 58. As the upper portion of the screen 60 collects more debris, the screen 60 begins to collapse or flatten into a relatively arcuate configuration (see FIG. 6) due to the increasing weight of the debris. The arcuate configuration promotes debris 65 accumulation in the proximate center of the screen 60 thereby allowing a relatively clean perimeter position 64 of the screen 60 to continuously drain water from the enclosure 12.

[0034] Referring now to FIG. 7, the device 10 detailed above is depicted with an alternative embodiment of the debris collection screen 60 in accordance with the present invention. The alternative debris collection screen 70 includes an upper portion 72 having an opened hemispherical configuration and positioned such that the upper portion opening 73 is adjacent to the inlet 16 of the enclosure 12 thereby promoting the collection of debris entering the enclosure via the inlet 16. The screen 70 further includes a lower portion 74 having an opened hemispherical configuration and positioned such that the lower portion opening 76 is positioned adjacent to the outlet 18 of the enclosure 12. The lower portion 74 is joined to and thereby elevates the upper portion 72 to promote better drainage of water from the enclosure 12 via the outlet 18. The upper portion 72 includes a substantially centered debris collection basin 78 positioned between the inlet and the outlet of the enclosure 12. An individual gains access to the collection basin 78 for debris removal while the screen 70 remains in the enclosure 12, via an aperture 80 that joins with the upper portion opening 73.

[0035] Referring now to FIG. 8, a second alternative embodiment of the debris collection screen 60 in accordance with the present invention is depicted. The second alternative debris collection screen 82 includes upper and lower portions 84 and 85 having opposing, substantially U-shaped configurations. The upper portion 84 includes an arcuate debris collecting lower section 83 that generally urges debris toward a mid-region of the upper portion 84 to allow better water drainage through the upper portion 84. The upper and lower portions 84 and 85 are positioned such that open channels 86 and 87 cooperate with the lid 48 to provide access to the collection screen 82 for an individual to remove debris from the upper portion 84, which collects debris entering the enclosure 12 via the inlet 16, and to remove debris from the outlet screen 58 which collects a small amount of debris that flows around the collection screen 82. The arcuate lower section 83 is positioned closer to the outlet 18 than the inlet 16 of the enclosure 12 thereby forming a larger upper portion 84 relative to the lower portion 85. The lower portion 85 is sized to allow a person's hand to remove debris collected by the outlet screen 58. The larger upper portion 84 is sized to collect a corresponding larger quantity of debris without impeding water flow through the enclosure 12. Thus, the collection screen 82 requires less cleaning, and may be cleaned while remaining in the enclosure 12.

[0036] The foregoing description is for purposes of illustration only and is not intended to limit the scope of protection accorded this invention. The scope of protection is to be measured by the following claims, which should be interpreted as broadly as the inventive contribution permits.

1. A gutter downspout debris collection device comprising:
   an enclosure having an inlet and outlet configured to integrally join to a gutter downspout;
   a debris collection screen inserted in said enclosure;
   means for removing the debris from said debris collection screen without removing said debris collection screen from said enclosure; and
   an outlet screen positioned to prevent debris from falling through said enclosure outlet when removing the debris from said debris collection screen.
2. The device of claim 1 wherein said enclosure is transparent.
3. The device of claim 1 wherein said screen includes an upper portion having an opened hemispherical configuration and positioned such that said upper portion opening is adjacent to said inlet of said enclosure thereby promoting the collection of debris entering said enclosure via said inlet.
4. The device of claim 3 wherein said screen includes a lower portion having an opened hemispherical configuration and positioned such that said lower portion opening is positioned adjacent to said outlet of said enclosure.
5. The device of claim 4 wherein said upper and lower portions are joined together to form a substantially centered basin positioned between said inlet and said outlet of said enclosure.

6. The device of claim 5 wherein said upper portion includes an aperture to allow an individual access to said basin to remove debris collected therein.

7. The device of claim 1 wherein said debris removing means includes an aperture in said enclosure, said aperture being configured to allow an individual access to said debris collection screen.

8. The device of claim 7 wherein said aperture includes a water tight cover removably secured thereto.

9. The device of claim 8 wherein said cover includes a water tight flap that is hinged to allow said flap to be pivoted to a non-obtrusive position thereby allowing an individual access to said debris collection screen.

10. The device of claim 9 wherein said flap includes latching means positioned opposite to said hinge to maintain said flap in a water tight closed position.

11. The device of claim 1 wherein said screen is fabricated from a relatively deformable material.

12. The device of claim 3 wherein said upper screen portion includes a substantially U-shaped configuration.

13. The device of claim 4 wherein said lower screen portion includes a substantially U-shaped configuration.

14. The device of claim 12 wherein said upper screen portion is positioned such that an open side of said upper screen portion cooperates with said debris removing means to promote the removal of debris from said upper screen portion.

15. The device of claim 13 wherein said lower screen portion is positioned such that an open side of said lower screen portion cooperates with said debris removing means to promote the removal of debris collected by said outlet screen.

16. The device of claim 1 wherein said debris collection screen includes apertures having a substantially square configuration.

17. The device of claim 16 wherein said apertures include sides having a dimension of substantially about three-eighths of an inch.

18. The device of claim 1 wherein said housing is substantially cube configured.

19. A method for collecting gutter downspout debris, said method comprising the steps of: providing a enclosure having an inlet and outlet configured to integrally join to a gutter downspout; providing a debris collection screen inserted in said enclosure; removing the debris from said debris collection screen without removing said debris collection screen from said enclosure; and positioning an outlet screen to prevent debris from falling through said enclosure outlet when removing the debris from said debris collection screen.

20. A device for collecting debris flowing through a gutter downspout comprising: an enclosure adapted for installation into the gutter downspout, said enclosure having an inlet and outlet; means for collecting the debris flowing through the gutter downspout, said debris collecting means adapted for removable installation in said enclosure; means for removing the collected debris from said enclosure without removing said debris collecting means; and means for preventing debris from passing through said enclosure outlet when removing the debris from said enclosure.

21. The device of claim 20 wherein said debris collecting means includes a cylindrically configured debris collection screen.

22. The device of claim 21 wherein said debris collection screen is deformable.

23. The device of claim 22 wherein said debris collection screen is resilient.

24. The device of claim 21 wherein said debris collection screen is positioned into a deformed configuration that corresponds to the quantity of debris collected by said screen.

25. The device of claim 25 wherein said deformed configuration promotes continuous water drainage from said enclosure.

26. The device of claim 25 wherein said deformed configuration allows an individual access to collected debris to remove the collected debris from said enclosure without removing said debris collection screen.