A stormwater drain backflow control device having a sheet-like, liquid impermeable, skirt member, preferably flexible, and a circular drain opening to allow water to flow through the device and into the catch basin. A cage assembly depends beneath the skirt member beneath the opening, the cage assembly retaining a spherical float member in a manner that allows the float member to rise within the cage assembly and seal the drain opening in the event that the water level within the catch basin rises.
STORMWATER DRAIN BACKFLOW FLOOD CONTROL DEVICE

[0001] This application claims the benefit of U.S. Provisional Patent Application Ser. No. 61/642,753, filed May 4, 2012, the disclosure of which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

[0002] Stormwater systems comprising a plurality of stormwater drains and catch basins interconnected by underground pipes are well known. Many stormwater systems cannot handle high volumes of water due to heavy rain storms, or the stormwater systems are located in low lying areas where high tides can back up water in the system. In these cases the backflow of water will sometimes pour out of the catch basin and flood the streets.

[0003] It is an object of this invention to provide a stormwater drain flood control device that will not interfere with the normal storm water removal process but which will close the stormwater drain responsive to backflow within the catch basin, thereby precluding the overflow of water into the street. It is a further object to provide such a device that can be quickly and easily inserted within existing stormwater drains and removed from the drains, the device being retained within the stormwater drain catch basin beneath the apertured grate by the weight of the grate, such that physical affixation to the storm drain by mechanical fasteners or the like is not required.

SUMMARY OF THE INVENTION

[0004] The invention is a stormwater drain flood control device adapted to be quickly and easily positioned within the catch basin of a stormwater drain, and quickly and easily removed as well, the device preventing overflow of water from the stormwater drain onto the ground surface in the event of water backflow in the catch basin and stormwater system. The device comprises a preferably flexible, sheet-like, liquid impermeable skirt member, having a drain opening to allow water to flow through the device and into the catch basin. A cage assembly is joined to the skirt member beneath the opening, the cage assembly retaining a spherical float member in a manner that allows the float member to rise within the cage assembly and seal the drain opening in the event that the water level within the catch basin rises to surface level.

[0005] In other terms, the invention is a stormwater drain backflow control device comprising a skirt member composed of a liquid impermeable material and having an opening; a cage assembly connected to said skirt member, said cage assembly comprising a guide chute and a circular opening communicating with said opening of said skirt member; a spherical float member retained within said guide chute, wherein the diameter of said float member is greater than the diameter of said cage assembly circular opening; and wherein said float member is disposed between said grate and said catch basin shoulder such that said cage assembly is positioned beneath said skirt member and within said catch basin, whereby said spherical float member is freely retained within said guide chute such that rising water within said catch basin forces said spherical float member upward into said cage assembly circular opening, thereby sealing said cage member circular opening and preventing said water from passing upward through said grate.

[0006] Furthermore, the invention is a method of preventing backflow through a stormwater drain catch basin comprising a removable grate positioned atop a catch basin shoulder comprising the steps of providing a stormwater drain backflow control device comprising a skirt member composed of a liquid impermeable material and having an opening; a cage assembly connected to said skirt member, said cage assembly comprising a guide chute and a circular opening communicating with said opening of said skirt member; a spherical float member retained within said guide chute, wherein the diameter of said float member is greater than the diameter of said cage assembly circular opening; whereby said spherical float member is freely retained within said guide chute such that rising water forces said spherical float member into said cage assembly circular opening, thereby sealing said cage member circular opening; removing said grate and positioning said skirt member between said grate and said catch basin shoulder such that said cage assembly is positioned within said catch basin; and replacing said grate such that the weight of said grate retains said stormwater drain backflow flood prevention device within said catch basin.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] FIG. 1 is a top view of an embodiment of the stormwater drain backflow control device.

[0008] FIG. 2 is a side view of the embodiment of FIG. 1.  

[0009] FIG. 3 is a cross-sectional view of the embodiment of FIG. 1, the device shown in the sealed position due to high water within the catch basin.

[0010] FIG. 4 is a perspective view of an alternative embodiment of the device, showing a screen member in place atop the cage member.

DETAILED DESCRIPTION OF THE INVENTION

[0011] With reference to the drawings, embodiments of the invention will now be described in detail. In general, the invention is a stormwater drain backflow control device adapted to be positioned within the catch basin of a stormwater drain, the catch basin comprising walls 22 and a shoulder 23, the shoulder being configured to receive an apertured grate 21 so that its upper surface is generally flush with the ground surface. Stormwater runoff falls into the catch basin through the grate 21 and passes into underground pipes forming the stormwater removal system. Such stormwater drain systems are well known. The stormwater drain flood control device is adapted to be quickly and easily received by the
stormwater drain and prevents overflow of the stormwater drain in the event of water backflow in the catch basin and stormwater system.

[0013] The stormwater drain backflow control device comprises a preferably flexible, non-self-supporting, sheet-like, liquid impermeable skirt member 11, the skirt member 11 having a generally centralized opening 17 to allow water to flow through the skirt member 11 and into the catch basin when the skirt member 11 is positioned within the catch basin. A cage assembly 12 is joined to the skirt member 11 to depend beneath the opening 17, the cage assembly 12 retaining a spherical float member 18 in a manner that allows the float member 18 to rise within the cage assembly 12 to close a circular drain opening 19 located at the top of the cage assembly 12 in the event that the water 24 within the catch basin rises. The skirt member 11 is sized to extend beyond the perimeter of the grate 21 such that the device may be retained in the catch basin by extending the outer portions of the skirt member 11 over the catch basin shoulders 23 and placing the heavy grate 21 on top of the skirt member 11, the weight of the grate 21 being sufficient to secure the skirt member 11 between the grate 21 and the catch basin shoulder 23. Any excess skirt member 11 material may be trimmed. Additional or alternative mechanisms for securing the skirt member within the catch basin may be utilized, such as by utilizing ties, straps, hooks, fasteners, frame members or the like to connect the skirt member 11 to the grate 21 or the catch basin shoulders 23 or walls 22.

[0014] A cage assembly 12 is joined to the skirt member 11 beneath the opening 17, the cage assembly 12 having a circular drain opening 19 matched with and in communication with the skirt opening 17. The cage assembly 12 is a mostly open construct such that water, debris, sticks, trash or the like flowing the drain opening 17 is not restricted or captured within the cage assembly 12. The open area of the cage assembly 12 exceeds and preferably greatly exceeds the open area of the drain opening 19. In a preferred embodiment as shown in the drawings, the cage assembly 12 comprises an upper plate 13 and a lower plate 14 joined by a plurality of vertically oriented connector members 15 that define a guideway or guide chute 20. The circular drain opening 19 is disposed in the upper plate 13. The skirt member 11 may be attached above or below the upper plate 13. A spherical float member 18 is retained within the guide chute 20 of the cage assembly 12, the spacing of the connector members 15 being such that the spherical float member 18 cannot pass between them and is therefore retained therein. The drain opening 19 in the upper plate is sized such that the diameter of the drain opening 19 is less than the diameter of the spherical float member 18, such that the float member 18 cannot pass through the drain opening 19, but instead will seal the drain opening 19 when high water is encountered and the float member 18 is forced into the drain opening 19.

[0015] Spacer members 16, such as elongated bars, may be positioned atop the upper plate 13 to insure that there is sufficient clearance between the upper plate member 13 and the underside of the grate 21 for the float member 18 to completely seal the drain opening 19 even if the skirt 11 is pulled taut beneath the grate 21, as shown in FIG. 3.

[0016] Alternatively, components of the cage assembly 12 may comprise wire mesh or screen, apertured sheet material or the like. The float member 18 may be hollow or solid, and is preferably formed of a foam polymer material. The lower plate 14 may be provided with a circular opening 25 to receive the spherical float member 18 when the flood control device is in the neutral position as seen in FIG. 2.

[0017] In another alternative embodiment, the skirt member 11 may be formed as a substantially rigid member, such as by constructing the skirt member 11 out of sheet metal or rigid plastic sheet material, in which case the skirt member 11 may be pre-formed to the correct perimeter dimensions, or bent and cut to conform to and fit the configuration of the catch basin shoulders 23. A peripheral gasket may be provided between the catch basin shoulders 23 and the edges of the grate 21 to better seal the perimeter of the skirt member 11.

[0018] Liquid permeable filter material or screen 26 of known type in the stormwater industry may be disposed above or across the drain opening 19, above or below or enveloping the grate 21, to prevent sediment, oil, debris, etc. from entering the stormwater system. As shown in FIG. 4, the screen 26 is raised to act as a spacer. Alternatively, the screen or filter material may be used in conjunction with separate spacer members 16. The device may also be utilized with curb inlet catch basins or manholes.

[0019] It is understood that equivalents and substitutions for certain elements set forth above may be obvious to one of skill in the art, and therefore the true scope and definition of the invention is to be as set forth in the following claims.

1. A stormwater drain backflow control device comprising:
   a skirt member composed of a liquid impermeable material and having an opening;
   a cage assembly connected to said skirt member, said cage assembly comprising a guide chute and a circular opening communicating with said opening of said skirt member;
   a spherical float member retained within said guide chute, wherein the diameter of said float member is greater than the diameter of said cage assembly circular opening;
   whereby said spherical float member is freely retained within said guide chute such that rising water forces said spherical float member into said cage assembly circular opening, thereby sealing said cage member circular opening.

2. The device of claim 1, wherein said cage assembly further comprises an upper plate, and wherein said guide assembly circular opening is positioned within said upper plate, and wherein said skirt member is connected to said upper plate.

3. The device of claim 2, wherein said cage assembly further comprises a lower plate member.

4. The device of claim 1, wherein said guide chute comprises elongated rod members.

5. The device of claim 1, wherein said skirt member material is a flexible, non-self-supporting material.

6. The device of claim 2, further comprising spacer members positioned on said upper plate.

7. The device of claim 1, further comprising a filter or screen material positioned across said cage assembly circular opening.

8. The device of claim 7, wherein said filter or screen material is positioned above said cage assembly circular opening.

9. A stormwater drain backflow control device in combination with a storm drain catch basin comprising a catch basin wall, a catch basin shoulder and a removable grate positioned on said catch basin shoulder, said stormwater drain backflow flood prevention device comprising:
a skirt member composed of a liquid impermeable material and having an opening;
a cage assembly connected to said skirt member, said cage assembly comprising a guide chute and a circular opening communicating with said opening of said skirt member;
a spherical float member retained within said guide chute, wherein the diameter of said float member is greater than the diameter of said cage assembly circular opening;
and wherein said skirt member is disposed between said grate and said catch basin shoulder such that said cage assembly is positioned beneath said skirt member and within said catch basin, whereby said spherical float member is freely retained within said guide chute such that rising water within said catch basin forces said spherical float member upward into said cage assembly circular opening, thereby sealing said cage member circular opening and preventing said water from passing upward through said grate.

10. The device of claim 9, wherein said cage assembly further comprises an upper plate, and wherein said guide assembly circular opening is positioned within said upper plate, and wherein said skirt member is connected to said upper plate.

11. The device of claim 10, wherein said cage assembly further comprises a lower plate member.

12. The device of claim 9, wherein said guide chute comprises elongated rod members.

13. The device of claim 9, wherein said skirt member material is a flexible, non-self-supporting material.

14. The device of claim 10, further comprising spacer members positioned on said upper plate.

15. The device of claim 9, further comprising a filter or screen material positioned across said cage assembly circular opening.

16. The device of claim 15, wherein said filter or screen material is positioned above said cage assembly circular opening.

17. A method of preventing backflow through a stormwater drain catch basin comprising a removable grate positioned atop a catch basin shoulder comprising the steps of:
providing a stormwater drain backflow control device comprising:
a skirt member composed of a liquid impermeable material and having an opening;
a cage assembly connected to said skirt member, said cage assembly comprising a guide chute and a circular opening communicating with said opening of said skirt member;
a spherical float member retained within said guide chute, wherein the diameter of said float member is greater than the diameter of said cage assembly circular opening;
whereby said spherical float member is freely retained within said guide chute such that rising water within said catch basin forces said spherical float member into said cage assembly circular opening, thereby sealing said cage member circular opening;
removing said grate and positioning said skirt member between said grate and said catch basin shoulder such that said cage assembly is positioned within said catch basin; and
replacing said grate such that the weight of said grate retains said stormwater drain backflow flood prevention device within said catch basin.

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