MANHOLE DEBRIS CATCHER

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ABSTRACT

One aspect of the invention relates to a support assembly configured for removable mounting inside a manhole. The support assembly includes an anchor assembly having a mounting ring and at least two adjustable anchors secured to the mounting ring, and a setter assembly secured to the mounting ring. The setter assembly is capable of holding the anchor assembly in a predetermined position relative to an inside surface of the manhole and the anchors are adjustable relative to the mounting ring to contact the inside surface of the manhole thereby mounting the support assembly to the inside of the manhole.
MANHOLE DEBRIS CATCHER

This application claims priority from provisional application Serial No. 60/404,108, filed Aug. 15, 2002, and which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

1. Field of Invention

The present invention generally relates to support structures for manholes and catch basins, and more specifically relates to a support structure for a debris catcher.

2. Related Art

Manholes, catch basins, and other structures that provide access to underground enclosures and utilities must be opened on occasion for access to the underground enclosures or utilities (for description purposes, manholes, catch basins and underground access structures will be referred to simply as "manholes" or a "manhole"). At other times, it is desired to cover the manhole to ensure that foreign objects such as dirt, debris, animals or water do not infiltrate the manhole and contaminate or harm what is otherwise accessible through the manhole.

One example scenario in which it is important to cover a manhole is when the manhole is being raised or repaired. When a manhole is raised or repaired, the lid that is typically used to cover the manhole must be removed to provide access to the manhole cone section (structures similar to manhole cone sections may be associated with catch basins and the like underground accesses). These and other types of construction projects that take place around an otherwise uncovered manhole cone section, such as re-grading of a road or replacing buried utilities, can produce significant amounts of debris that should be kept from entering the manhole. Known temporary manhole covers that attempt to keep dirt and debris out of the manhole during such construction projects are typically cumbersome and difficult to use, or they are mounted to the manhole in such a way that they are inadvertently removed or are in the way of the project being completed.

SUMMARY

Generally, the invention relates to support structures for manholes, catch basins and like underground access structures. More specifically, the invention relates to a support structure for a debris catcher that prevents debris from entering into a manhole.

One aspect of the invention relates to a support assembly configured for removable mounting inside a manhole. The support assembly includes an anchor assembly having a mounting ring and at least two adjustable anchors secured to the mounting ring, and a setter assembly secured to the mounting ring. The setter assembly is capable of holding the anchor assembly in a predetermined position relative to an inside surface of the manhole while the anchors are adjusted relative to the mounting ring to fix the support assembly to the inside of the manhole.

Another aspect of the invention relates to a method of mounting a support assembly to inside surfaces of an enclosed structure. The support assembly includes a setter assembly and an anchor assembly, and the method includes securing the setter assembly to the anchor assembly, mounting the setter assembly to the inside surface of the enclosed structure, and mounting the anchor assembly to the inside surface of the enclosed structure.

Another aspect of the invention relates to a manhole debris catcher suitable for use inside a manhole structure that includes a support assembly and a catcher mat. The support assembly includes an anchor assembly configured to contact inside surfaces of the manhole structure to removably mount the support assembly within the manhole structure, and a setter assembly configured to hold the anchor assembly in a predetermined position in the manhole structure while the anchor assembly is removably mounted to the inside surfaces of the manhole structure. The catcher mat is configured for mounting on top of the anchor assembly when the anchor assembly is removably mounted in the manhole structure.

A yet further aspect of the invention relates to an enclosed structure assembly that includes an enclosed structure having side walls and a plurality of holes preformed in the sidewalls, and a support structure having at least two adjustable arms sized to engage the holes. The arms are configured to adjust between a first position engaging the holes so as to mount the support structure in the enclosed structure, and a second position disengaged from the holes such that the support structure is capable of being removed from the enclosed structure.

The above summary of the present invention is not intended to describe each disclosed embodiment or every implementation of the present invention. Figures in the detailed description that follow more particularly exemplify embodiments of the invention. While certain embodiments will be illustrated and described, the invention is not limited to use in such embodiments.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention may be more completely understood in consideration of the following detailed description of various embodiments of the invention in connection with the accompanying drawings, in which:

FIG. 1. is a top perspective view of one example catcher support assembly according to the present invention.

FIG. 2. is a top perspective view of one example catcher mat that may be supported by the support assembly shown in FIG. 1.

FIG. 3. is a perspective view of an example manhole into which the support assembly of FIG. 1 and the mat of FIG. 2 may be mounted.

FIG. 4. is a perspective view of an adjustable anchor of the support assembly shown in FIG. 1 mounted to a support ring.

FIG. 5. is a partial perspective view of a setter arm of the support assembly shown in FIG. 1 mounted to a support ring.

FIG. 6. is a partial bottom perspective view of a setter assembly of the support assembly shown in FIG. 1.

FIG. 7. is a cross-sectional side view of the support assembly shown in FIG. 1 in a retracted position.
FIG. 8 is a top perspective view of an example anchor assembly portion of a circular shaped support assembly mounted in a manhole.

FIG. 9 is a top perspective view of another example anchor assembly portion of a rectangular shaped support assembly mounted in a catch basin.

FIG. 10 is a top perspective view of another example support mounted to pre-formed holes in the manhole.

While the invention is amenable to various modifications and alternate forms, specifics thereof have been shown by way of example and the drawings and will be described in detail. It should be understood, however, that the intention is not to limit the invention to the particular embodiments described. On the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the invention.

DETAILED DESCRIPTION

The present invention relates generally to a manhole catcher assembly configured for use in a manhole structure. The example support structures disclosed herein are configured to support a catcher device such as a filter, stopper or other material inside the manhole structure to prevent debris or other material from passing beyond the catcher device further into the manhole. While the present invention is not so limited, an appreciation of the various aspects of the invention will be gained through a discussion of the examples provided below.

One primary use of the present invention is to stop unwanted materials from entering a confined space such as a manhole, pipe, catch basin, vault, etc. The present invention provides a quick and easy way of mounting to an interior surface and then providing a surface upon which a filter or stopper material may be placed. In a preferred embodiment, the present invention may be quickly installed and removed by one person. In the examples provided below, a catcher of the present invention is mounted to the generally vertically extending interior wall of a manhole. Other applications of the present invention may be useful for mounting in a manhole or other structure with sidewalls that extend at an angle or that extend in a generally horizontal direction.

As used herein, the term “adjustable” includes adjustments in the length, width or height of an object or device and may include any type of adjustment configuration alone or in combination with another structure. A “mounting ring” may include any shape such as, for example, a circle, oval, rectangle, hexagon, or triangle.

One example support assembly 10 shown in FIG. 1 may be used in conjunction with a catcher mat 18 shown in FIG. 2 and a manhole structure 14 shown in FIG. 3. The support assembly 10 is configured for mounting within the manhole structure and for supporting the catcher mat 12. The catcher mat 12 is preferably sized to closely fit within manhole structure 14 so as to prevent debris or other objects from entering into manhole structure 14 when catcher mat 12 is supported by support assembly 10.

Support assembly 10 includes a setter assembly 20 and an anchor assembly 70, as shown in FIG. 1. Setter assembly 20 is further described with reference to FIGS. 5-8 and includes a mounting plate 22, adjustable arms 24A-C and an arm engaging assembly 26. Setter assembly 20 may be used to maintain a temporary position of support assembly 10 within manhole structure 14 while anchor assembly 70 is mounted to the manhole structure 14, or in other embodiments may be used as a more permanently fixed structure that supports catcher mat 18 without anchor assembly 70.

Adjustable arms 24A-C each include first and second members 30, 32, a mounting bracket 34, and first and second fasteners 38, 40. In this example, first and second arm members 30, 32 are movable relative to each other in a compression shock configuration such that second member 32 is insertable within first member 30 when a longitudinal force is applied along an axis of the arm. Bracket 34 is configured to secure adjustable arms 24A-C to anchor assembly 70. First fastener 38 with an associated fastener ring 39 promotes easy attachment and detachment of arms 24A-C to anchor assembly 70 (see FIG. 5). Second fastener 40 (see FIG. 5) may be used to retain first and second members 30, 32 together, wherein removal of second fastener 40 would allow the first and second members 30, 32 to be detached from each other.

Contact member 36 is shown as a cylindrical shaped pad mounted at an end of the adjustable arms. Contact member 36 may be pivotally secured to the adjustable arms and may be made out of a pliable resilient material so as to conform to different shaped mounting surfaces without damaging the mounting surface while providing the necessary friction contact between the adjustable arms 24A-C and the mounting surface. In other embodiments, contact member 36 may have alternative shapes and sizes such as, for example, a pointed structure that allows the contact member to be embedded into the mounting surface to ensure that a predetermined position of the setter assembly 20 is maintained.

Mounting plate 22 includes arm mounting brackets 50A-C, support handle brackets 52A,B, and an aperture 54 to receive a portion of arm engaging assembly 26 (see FIGS. 6 and 7). Arm mounting brackets 50A-C provide pivotal attachment of the adjustable arms 24A-C to mounting plate 22. A support handle 64 may be secured to mounting plate 22 with the support handle brackets 52A-V and may be pivotally secured to mounting plate 22 so as to pivot between an up position (see FIGS. 1 and 7) and a down position (see FIG. 6). The support handle 64 may be used to support setter assembly 20 at a given position within manhole structure 14 and may further be used to move and/or carry setter assembly 20 alone or when assembled together with anchor assembly 70.

Arm engaging assembly 26 includes an engaging ring 60 and an engaging handle 62. Arm engaging assembly 26 is movable in a vertical direction as illustrated in FIG. 7 to force the adjustment arms 24A-C from a second position 58 sloping downward from a horizontal orientation (see FIG. 7) to a first position 56 in which the adjustable arms 24A-C reside in a generally horizontal orientation (see phantom lines representing the horizontal position in FIG. 7). Engaging handle 62 is secured to engaging ring 60 and extends through aperture 54 in mounting plate 22 such that moving engaging handle 62 in the direction A shown in FIG.
7 causes the engaging ring 60 to engage and move adjustable arms 24A-C. It may be useful to use support handle 64 as a base structure against which engaging handle 62 may be drawn in order to move adjustable arms 24A-C between the second and first positions 58, 56.

[0034] One advantage of having a setter assembly 20 that is movable between the second and first positions is that support assembly 10 has a smaller diameter 12 when in second position 58 than the diameter 11 of support assembly 10 when in the first position (see FIG. 7). As a result, support assembly 10 can be more easily inserted and positioned within manhole structure 14 when in the second position 58 due to its smaller diameter, and then be adjusted into the larger diameter configuration of first position 58 so as to securely mount support assembly 10 within the manhole structure 14.

[0035] In other examples, setter assembly 20 may have an alternative configuration in which the adjustable arms 24A-C do not move up and down as shown in FIG. 7, but rather maintain a generally horizontal position and merely move radially outward and inward from mounting plate 22 upon activation of an adjustment mechanism. For example, adjustable arms 24A-C may be spring loaded shock members that extend outwardly in a radial direction when activated so as to move from a first diameter size that freely moves within manhole structure 14 for easy manipulation and positioning, and a second diameter size in which ends of adjustable arms 24A-C contact the manhole structure 14 to maintain a temporary position while the anchors of anchor assembly 70 are firmly secured to the manhole structure. Other example for adjustable arm configurations include, for example, hinged and threaded arms.

[0036] Anchor assembly 70 includes a mounting ring 72, and anchors 74A-C that each include an anchor handle 75, an anchor bracket 76, a threaded portion 77, and an anchor biasing member 78 associated with it (see FIGS. 4 and 7). Anchor brackets 76 includes first and second positioning stops 82, 83 that engage a locking peg 80 positioned on mounting ring 72 so as to lock the anchor in either a vertical position (see FIGS. 1 and 7) or a generally horizontal position (see FIG. 8). Biasing member 78 urges the anchor against locking peg 80 to promote contact between the locking peg 80 and one of the first or second position stops 82, 83. A spring retaining peg 84 positioned on mounting ring 72 maintains the biasing member at a fixed position on the mounting ring 72.

[0037] At one end of anchors 74A-C, a contact member 86 is secured to promote contact between the anchor assembly 70 and manhole structure 14. As with contact member 36 associated with adjustable arms 24A-C, contact member 86 may have a variety of different shapes and sizes and may be made of different materials. Contact member 86 may also be mounted to anchors 74A-C in a variety of different ways to promote optimal contact with the manhole structure 14.

[0038] In the examples shown in FIGS. 1-8, setter assembly 20 is intended to be removed from anchor assembly 70 after anchors 74A-C of the anchor assembly are firmly secured to an inner surface 94 within an internal space 93 of a cone section 90 of manhole structure 14 (see FIGS. 3 and 8). After the setter assembly 20 is detached from anchor assembly 70 and removed from the manhole structure 14, the catcher mat 12 may be mounted on top of the anchor assembly 70. In the case where the catcher mat 12 is made of a pliable material that does not maintain a flat configuration on its own, for example, if the catcher mat is made of thin rubber material, additional support is required in a center portion of mounting ring 72 to support the catcher mat 12. A catcher mat support 86 (see FIG. 8) may be mounted onto the mounting ring 72 to provide such support. Catcher support 86 may have two or more support arms extending radially from a center point and may be made of one solid piece or multiple pieces secured together.

[0039] In other examples, (not shown) the setter assembly 20 may be permanently or semi-permanently secured to the anchor assembly 70 and designed to support the catcher mat 12 rather than being removed from the anchor assembly 70. This option may be less advantageous in the case where only one setter assembly 20 is available to set multiple anchor assemblies 70 in a separate manhole structure. However, if the setter assembly were to be used for supporting a catcher mat, the setter assembly may be designed with a lower profile than that disclosed in the above examples so that it does not extend vertically above the anchor assembly features.

[0040] Another example of anchor wall assembly 270 is shown in FIG. 9. Anchor assembly 270 includes a mounting ring 272 in the shape of a rectangle, and anchors 74A-F are arranged around mounting ring 272 so as to contact walls 294, 296, 298, 300 within an internal space 393 of a rectangular shaped catch basin 214. A catcher mat support (such as catcher mat support 86 shown in FIG. 8) may be used in conjunction with anchor assembly 270 so as to provide additional support for a catcher mat positioned on top of the anchor assembly. A setter assembly (not shown) may also be used in connection with anchor assembly 270 so long as the setter assembly includes an even numbers of adjustment arms for contacting opposing pairs of walls of the rectangular-shaped catch basin 214.

[0041] Another example is support assembly 110 as shown in FIG. 10. Support assembly 110 includes arms 124A-C connected to and extending radially from a mounting bracket 122. Ends of arms 124A-C may extend through preformed holes 116A-C of the manhole structure 114. Support assembly 110 may have a variety of different configurations using two or more arms with different mounting bracket configurations so as to provide a support structure that supports a catcher mat 12.

[0042] Although the above examples have been described with reference to supporting a catcher mat to prevent debris from entering into a manhole cone section, the support assemblies encompassed by the present invention may be used for alternative purposes. For example, the support assembly may be used to lock a manhole or other underground enclosure from entry by humans or other creatures in addition to preventing inanimate objects from entering into those structures. In order to meet this objective, support assembly 110 shown in FIG. 10 may be locked or otherwise assembled or may be sized so that unwanted objects of a particular size cannot pass beyond the support assembly when it is mounted in the manhole structure 114.

[0043] The present invention should not be considered limited to the particular examples or materials described above, but rather should be understood to cover all aspects of the invention as fairly set out in the attached claims.
Various modifications, equivalent processes, as well as numerous structures to which the present invention may be applicable will be readily apparent to those of skill in the art to which the present invention is directed upon review of the instant specification.

We claim:
1. A support assembly configured for removable mounting within a manhole, comprising:
   an anchor assembly having a mounting ring and at least two adjustable arms secured to the mounting ring; and
   a setter assembly secured to the mounting ring;

   whereby the setter assembly is capable of holding the anchor assembly in a predetermined position relative to an inside surface of the manhole, and the anchors are adjustable relative to the mounting ring to contact the inside surface of the manhole thereby mounting the support assembly to the inside of the manhole.

2. The support assembly of claim 1, wherein the mounting ring is circular shaped.

3. The support assembly of claim 1, wherein the setter assembly includes adjustable arms.

4. The support assembly of claim 3, wherein the arms are releasably secured to mounting ring.

5. The support assembly of claim 3, wherein the setter assembly includes a mounting plate and the adjustable arms are pivotally secured to the mounting plate.

6. The support assembly of claim 3, wherein the setter assembly is adjustable between a first position with the arms extending in a horizontal plane and a second position with the arms extending in a plane different from the horizontal plane.

7. The support assembly of claim 6, wherein the setter assembly includes an arm engaging structure configured to move the adjustable arms between the first and second positions.

8. The support assembly of claim 3, wherein the adjustable arms are compression shocks.

9. The support assembly of claim 1, further comprising a stopper mat configured for mounting on top of the anchor assembly.

10. The support assembly of claim 9, wherein the stopper mat comprises water resistant material and forms a water tight seal with the inside surface of the manhole.

11. A method of mounting a support assembly to inside surfaces of an enclosed structure, the support assembly including a setter assembly and an anchor assembly, the method comprising:

   securing the setter assembly to the anchor assembly;

   mounting the setter assembly to the inside surface of the enclosed structure; and

   mounting the anchor assembly to the inside surface of the enclosed structure.

12. The method of claim 11, further comprising removing the setter assembly and positioning a stopper mat on top of the anchor assembly.

13. The method of claim 11, wherein the setter assembly includes at least two arms, and step of mounting the setter assembly includes contacting the arms against the inside surface of the enclosed structure to hold the setter assembly in a fixed position.

14. The method of claim 11, wherein the setter assembly includes at least one adjustable arm and the anchor assembly includes a mounting ring, and step of securing the setter assembly includes securing the arms to the mounting ring.

15. The method of claim 13, wherein the setter assembly further includes a mounting plate and the adjustable arms are pivotally secured to the mounting plate so as to be movable between a first pivoted position and a second pivoted position, and the step of mounting the setter assembly further comprises moving the adjustable arms between the first and second pivoted positions.

16. The method of claim 15, wherein the setter assembly further includes an arm engaging structure configured to engage the adjustable arms when moved relative to the mounting plate, the step of mounting the setter assembly further comprising moving the arm engaging structure relative to the mounting plate to move the adjustable arms between the first and second pivoted positions.

17. The method of claim 11, wherein the anchor assembly includes a mounting ring and at least two anchors adjustably mounted to the mounting ring, and the step of mounting the anchor assembly includes moving the anchors relative to the mounting ring to contact the inside surface of the enclosed structure.

18. A manhole debris catcher suitable for use inside a manhole structure, comprising:

   a support assembly including an anchor assembly configured to contact inside surfaces of the manhole structure to removably mount the support assembly within the manhole structure; and

   a catcher mat configured for mounting on top of the anchor assembly when the anchor assembly is removably mounted in the manhole structure.

19. The catcher of claim 18, wherein the support assembly further includes a setter assembly configured to hold the anchor assembly in a predetermined position in the manhole structure while the anchor assembly is removably mounted to the inside surfaces of the manhole structure.

20. An enclosed structure assembly, comprising:

   an enclosed structure having side walls and a plurality of holes preformed in the sidewalls; and

   a support structure having at least two adjustable arms sized to engage the holes, the arms configured to adjust between a first position engaging the holes to mount the support structure in the enclosed structure, and a second position disengaged from the holes such that the support structure is capable of being removed from the enclosed structure.

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