A deck anchor insert for use in multi-story building structures with a deck form comprising an embedment portion comprising a generally round head and a threaded shaft extending from said head, an attachment assembly comprising a wing nut engaging said shaft proximal to said head; a deck retaining nut engaging said shaft adjacent to said wing nut; and a washer engaging said shaft between said wing nut and said deck retaining nut; and a coupling nut with a first end engaging said shaft adjacent to said deck retaining nut, and a second end. In some embodiments, a stop means is incorporated to prevent the stem from completely penetrating the coupling nut.
DECK ANCHOR INSERT

FIELD OF THE INVENTION

[0001] The apparatus herein is intended to be installed in the deck form of a multi-story concrete structure or building during construction to provide dependable hangars to the area below the deck form.

BACKGROUND OF THE INVENTION

[0002] During construction of a multi-story building or structure, it is often desirable to embed hanger connections into the concrete deck forms to provide utility attachments underneath the ceilings of the floor below. These deck anchors are typically used for supporting pipes, conduits, electrical fixtures, automatic sprinklers, air conditioning ducts, and other things that might be suspended from the ceiling.

[0003] In a concrete structure, a deck anchor may take the form of a bolt that is positioned by hand in a hole in the deck form before the concrete is poured. A threaded end of the bolt hangs down through the hole in the deck form. The concrete encases the head of the bolt, and objects can be suspended from the threaded end after the concrete has set. Examples of deck hangars may be found, for example, in U.S. Pat. Nos. 6,240,697, 4,007,563 and 3,896,599.

[0004] There is a need for a dependable deck anchor that can be quickly and easily installed to a desired embedment height within the concrete before the concrete is poured so that it will exhibit great strength after the concrete has set, and to which objects may be readily coupled using an optimal length of the threaded end that hangs down below the deck form.

SUMMARY OF THE INVENTION

[0005] The invention resides in a deck anchor for use in a multi-story building structure. The anchor has an embedment portion, an installation assembly, and a utility attachment portion. The embedment portion comprises a head and a shaft. The utility attachment portion comprises a coupling nut with a first end for engaging the shaft, which when removed exposes an alternate utility attachment comprising the threaded portion of the shaft. In some embodiments the coupling nut includes a stop to prevent the shaft from penetrating all the way through the coupling nut.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] The invention will be better understood and further objects, characteristic features, details and advantages thereof will appear more clearly with reference to the following diagrammatic drawings.

[0007] FIG. 1 is a perspective view of a first embodiment.

[0008] FIG. 2 is an exploded view of a first embodiment.

[0009] FIG. 3 is a cross-section of the first embodiment of the coupling nut with a stop therein.

[0010] FIG. 4 is a cross-section of a second embodiment of the coupling nut with a gap in the thread.

[0011] FIG. 5 is a cross-section of a third embodiment of the coupling nut with counter cross threads.

[0012] FIG. 6 is a perspective view of a first embodiment in actual use with concrete poured on the deck form embedding the apparatus.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0013] As shown in FIGS. 1, 2 and 6, an embodiment of the invention provides a deck anchor insert generally 10 for use in a multi-story structure with deck form 40. The apparatus 10 comprises an embedment portion 12, utility attachment portion 17 and installation assembly 20.

[0014] The embedment portion 12 comprises a head 14 and a shaft 16. The diameter and profile of head 14 may vary including but not limited to a generally round domed shape or round flat shape. The shaft 16 incorporates external threading 18. The shaft 16 may be fully threaded as close as practicable to the underside of the head 14 with rolled threads and coated with corrosion resistant material such as zinc with a chromate finish. At least the embedment portion 12 is formed from high quality carbon steel wire or bar. The head 14 and shaft 16 should approximate the following dimensional criteria, but may vary according to construction specifications including but not limited to embedment depth, concrete strength, embedment material strength, head height, shaft length or diameter, deck thickness, and utility attachment specifications.

<table>
<thead>
<tr>
<th>Nominal Dia. &amp; Threads</th>
<th>Head diameter</th>
<th>Head height</th>
<th>Shaft length at fillet.</th>
<th>Min. radius at fillet.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8-16 UNC</td>
<td>1&quot; + 0.015</td>
<td>0.200/0.180&quot;</td>
<td>2.75 + 0.020&quot;</td>
<td>¼&quot;</td>
</tr>
<tr>
<td>½-13 UNC</td>
<td>1/4&quot; + 0.030-0</td>
<td>0.235/0.215&quot;</td>
<td>2.650 + 0.020&quot;</td>
<td>¼&quot;</td>
</tr>
<tr>
<td>¾-11 UNC</td>
<td>1/8&quot; + 0.030-0</td>
<td>0.270/0.250&quot;</td>
<td>3.370 + 0.020&quot;</td>
<td>¼&quot;</td>
</tr>
<tr>
<td>¾-10 UNC</td>
<td>1/8&quot; + 0.030-0</td>
<td>0.290/0.270&quot;</td>
<td>3.150 + 0.025&quot;</td>
<td>¼&quot;</td>
</tr>
<tr>
<td>¾-99 UNC</td>
<td>1/8&quot; + 0.030-0</td>
<td>0.310/0.290&quot;</td>
<td>3.250 + 0.025&quot;</td>
<td>¼&quot;</td>
</tr>
</tbody>
</table>

[0015] The installation assembly 20 for affixing the deck anchor insert 10 within hole 42 in deck form 40 comprises a wing nut 22, a deck retaining nut 24, and washer 26. The wing nut 22 engages shaft 16 proximal to the head 14. The washer 26 is positioned on shaft 16 adjacent to the wing nut 22. A deck retaining nut 24 engages shaft 16 adjacent to the washer 26 and abutting the first end 31 of coupling nut 19. Of the installation portion 20, wing nut 22 and washer 26 will be embedded after the concrete is poured onto the deck forms. Retaining nut 24 is positioned under deck form 40 together with the utility attachment portion 17.

[0016] Retaining nut 24 may take any external shape including but not limited hexagonal, round, or square with or without flange. The bearing surface of retaining nut 24 in contact with the deck form 40 incorporates a means to lock the retaining nut against the deck form such as serrations, teeth, a sharpened bevel, or denticulation to enhance attachment and prevent loosening of the deck anchor insert 10 from the deck form 40. The retaining nut 24 is preferably heat treated to strengthen the means to lock the retaining nut against the deck form.
Washer 26 covers hole 42 in the deck form 40 through which the apparatus 10 is inserted thereby preventing the seepage of the poured concrete 50. Washer 26 is generally a rectangular shape or a modified round shape with opposite sides sheared parallel as depicted in FIGS. 1 and 2.

For proper embedment of the apparatus 10 in the concrete 50, the top of head 14 should be a minimum of two inches below the surface of the concrete 50 after pouring and curing of the concrete is complete.

The utility attachment portion 17 comprises either a coupling nut 19 or, after removal of the coupling nut 19, the exposed thread 18 on shaft 16 which can accommodate a female threaded utility attachment. The coupling nut 19 possesses internal threads which are used to thread the coupling nut 19 onto shaft 16 adjacent to deck retaining nut 24. The external shape of coupling nut may take any form including but not limited to hexagonal, round or square. The shaft 16 should not be threaded beyond an intermediate and/or midpoint of coupling nut 19. To prevent over-threading or under-threading of shaft 16 to coupling nut 19 a stop means 21 is incorporated on the internal threads of coupling nut 19. Coupling nut 19 is further secured in place by torquing the retaining nut 24 against first end 31 of coupling nut 19 to bias the lower face of the retaining nut against the first end of the coupling nut to form a friction bond.

As shown in FIG. 3, in one alternate embodiment the coupling nut 19 comprises an internal thread 23 extending within the coupling nut from the first end 31 toward a second end 32 and a stop 21a at an intermediate point between the ends. The stop 21a prevents the shaft 16 from penetrating through the coupling nut beyond the stop toward the second end.

As shown in FIG. 4, in another alternate embodiment, the coupling nut 19 comprises a first internal thread 43 extending from the first end 31 of the coupling nut and a second internal thread 44 extending from the second end 32 generally aligned with said first thread with a gap 21c between the first and second internal threads thereby preventing the shaft from penetrating completely through the coupling nut.

As shown in FIG. 5, in another embodiment the coupling nut 19 comprises a first internal thread 38 extending from the first end 31 of the coupling nut and a second internal thread 36 which is, counter to the first thread 38 extending from the second end 32 generally aligned with said first internal thread 38 which meet generally cross thread at an intermediate or midpoint stop 21b thereby preventing the shaft from penetrating completely through said coupling nut.

Additional means for preventing the shaft 16 from penetrating beyond an intermediate or midpoint of the coupling nut 19 to control the shaft engagement and, prevent over-insertion or under-insertion, include deformation of the internal thread by means of drilling holes through both sides of the coupling nut 19 directly opposite each other and installing a pins or externally punching the coupling nut at an intermediate or midpoint to distort the internal threads to create a stop 21.

The attachment portion 17 may be protected with a removable brightly colored cover 30 to prevent thread contamination and assist users in locating it from below before attaching the utilities to be suspended therefrom.

Installation of apparatus 10 requires the creation of an aperture 42 in deck form 40. The attachment portion 17 together with retaining nut 24 is placed through aperture 42. Installation assembly 20 engages deck form 40 between deck retaining nut 24 and washer 26. The apparatus 10 is shifted sideways in the aperture 43 allowing the retaining nut 24 to engage the underside of the deck form 40. Washer 26 is aligned to cover aperture 42 to prevent concrete seepage during pouring. Washer 26, wing nut 22, and embedment portion 12 are located above deck form 40 for embedment in the concrete 50 as depicted in FIG. 6. Once apparatus 10 engages deck form 40, wing-nut 22 is tightened down upon the washer 26 securing the deck form 40 therebetween; the apparatus 10 is ready for embedment. Concrete 50 is poured onto the deck form 40 to secure apparatus 10 within the building structure for the hanging of pipes and other utilities therefrom.

Further minor modifications can be made to the above described embodiment without departing from the scope of the same as defined in the appended claims.

1 claim:

1. A deck anchor insert for use in multi-story building structures with a deck form comprising:

An embedment portion comprises a generally round domed head and a threaded shaft extending from said head;

an attachment assembly comprising a wing nut engaging said shaft proximal to said head; a deck retaining nut engaging said shaft adjacent to said wing nut; and a washer engaging said shaft between said wing nut and said deck retaining nut; and

coupling nut with a first end and a second end, said first end of said coupling nut engaging said shaft and biased against said deck retaining nut to secure said coupling nut in place along said shaft.

2. The deck insert of claim 1 wherein said deck retaining nut comprises a means to lock the retaining nut against the deck form.

3. The deck anchor insert of claim 1 wherein said coupling nut comprises a single internal thread to engage said shaft, and a stop means located at an intermediate point of said internal thread to prevent said shaft from penetrating completely through said coupling nut.

4. The deck anchor insert of claim 1 wherein said coupling nut comprises a first internal thread extending from said first end of said coupling nut and a second internal thread which is counter to said first thread extending from said second end generally aligned with said first internal thread, said first and second threads meet generally in the middle of said coupling nut to prevent said shaft from penetrating completely through said coupling nut.

5. The deck anchor insert of claim 1 wherein the coupling nut comprises a first internal thread extending from said first end of said coupling nut and a second internal thread extending from said second end generally aligned with said first internal thread, said first and second threads meet generally in the middle of said coupling nut to prevent said shaft from penetrating completely through said coupling nut.

6. A deck anchor insert for use in multi-story building structures with a deck form comprising:

An embedment portion comprising a generally round domed head and a threaded shaft extending from said head;

An attachment assembly including a wing nut engaging said shaft proximal to said head; a deck retaining nut engaging said shaft adjacent to said wing nut; and a washer engaging said shaft located between said wing nut and said deck retaining nut.
a coupling nut with a first end and a second end, said first end of said coupling nut engaging said shaft and biased against said deck retaining nut to secure said shaft from penetrating completely through said coupling nut; and a stop means to prevent the shaft from penetrating completely through said coupling nut.

7. The deck insert of claim 6 wherein said deck retaining nut comprises a means to lock the retaining nut against the deck form.

8. The deck anchor insert of claim 6 wherein said stop means comprises a single thread extending from said first end through said second end to engage said shaft with a stop located on said internal thread preventing said shaft from penetrating completely through said coupling nut.

9. The deck anchor insert of claim 6 wherein said stop means comprises a first internal thread extending from said first end of said coupling nut and a second internal thread which is counter to said first thread extending from said second end generally aligned with said first internal thread and meeting generally in the middle of said coupling nut thereby preventing said shaft from penetrating completely through said coupling nut.

10. The deck anchor insert of claim 6 wherein said stop means comprises a first internal thread extending from said first end of said coupling nut and a second internal thread extending from said second end generally aligned with said first thread with a gap between said first and second internal threads generally at the middle thereby preventing said shaft from penetrating completely through said coupling nut.

11. A method for installing a deck anchor insert, comprising an embedment portion comprising a generally round head and a threaded shaft extending from said head, an attachment assembly comprising a wing nut engaging said shaft proximal to said head; a deck retaining nut engaging said shaft adjacent to said wing nut; and a washer engaging said shaft between said wing nut and said deck retaining nut; a coupling nut with a first end and a second end, said first end of said coupling nut engaging said shaft and biased against said deck retaining nut to secure said coupling nut in place along said shaft, comprising:

- Forming a hole in a deck form;
- Inserting said deck anchor insert into said hole;
- Shifting said deck anchor sideways to insert said deck form between said washer and said retaining nut;
- Aligning said washer to cover said hole to prevent concrete seepage during pouring;
- Tightening said wing nut against said washer to secure said deck form between said washer and said retaining nut; and
- Pouring concrete into said deck form, around and over said deck anchor insert.

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