United States Patent [19]

Last

[11] **3,709,455**

[45] **Jan. 9, 1973**

[54] TIE DOWN DEVICE

[75] Inventor: **Walter A. Last**, Islip, N.Y.

[73] Assignee: **Peck & Hale, Inc.**

[22] Filed: **Aug. 24, 1970**

[21] Appl. No.: **66,493**

[52] **U.S. Cl.** .....**248/361 A**, 24/221 R, 105/369 A

[51] **Int. Cl.** **B61d 45/00**

[58] **Field of Search** .....248/361 R, 361 A; 24/221 R; 105/369 A

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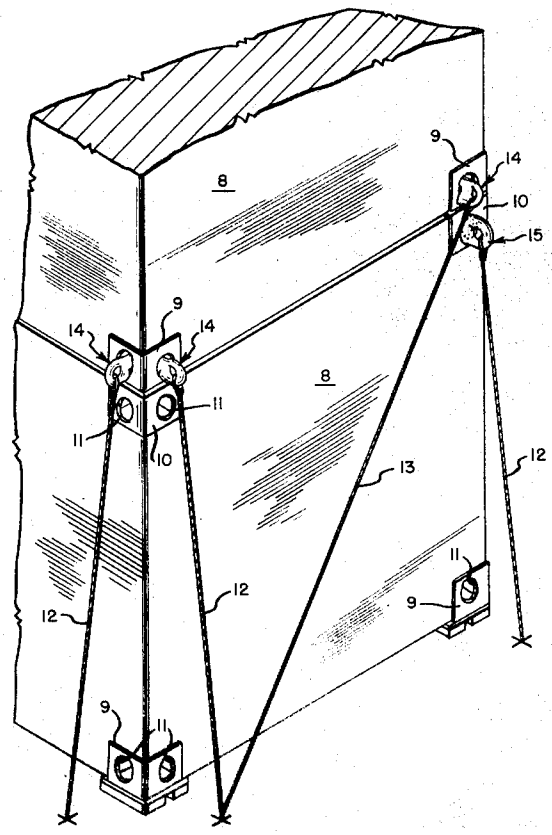
Primary Examiner—Chancellor E. Harris

Attorney—Pennie, Edmonds, Morton, Taylor & Adams

[57] **ABSTRACT**

A tie down device adapted to be secured selectively to an anchorage member having a web provided with either a circular opening or an anchorage member having a web provided with an elongated opening. The tie down device has an opening of its own for receiving the end fitting of lashing means and is retained within the openings of the anchorage members by an integral elongated flange. Depending upon the thickness of the web of the anchorage member, a notch in the shank element of the tie down device may operate as an integral lock engaging the web thereby functioning as an integral lock further to prevent the tie down device from disengaging under load.

5 Claims, 14 Drawing Figures



PATENTED JAN 9 1973

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SHEET 1 OF 3

FIG. 1

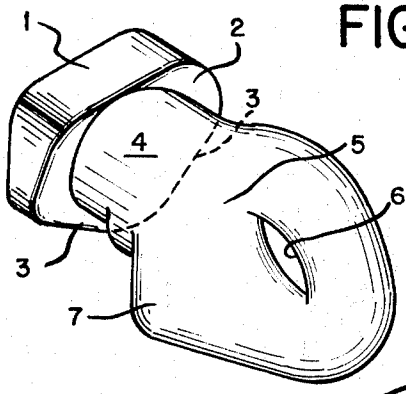
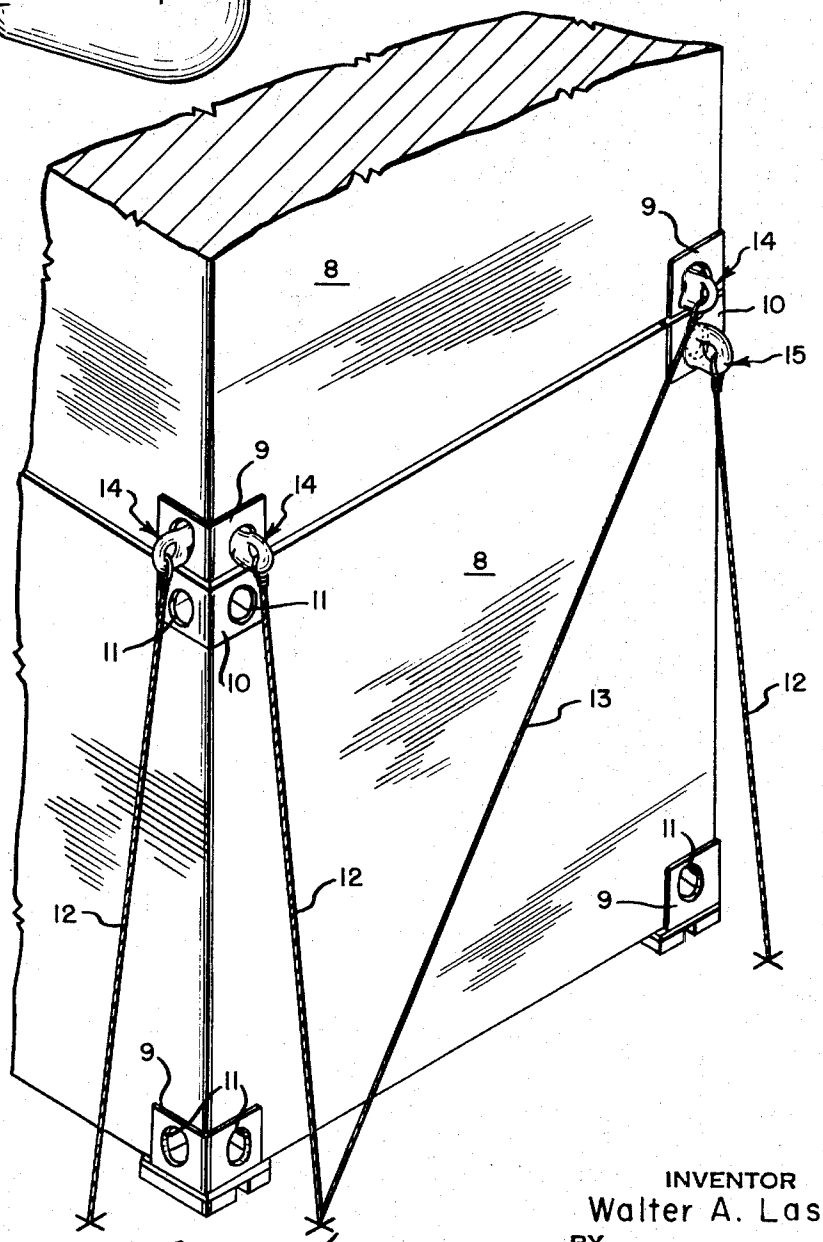


FIG. 2



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FIG. 3

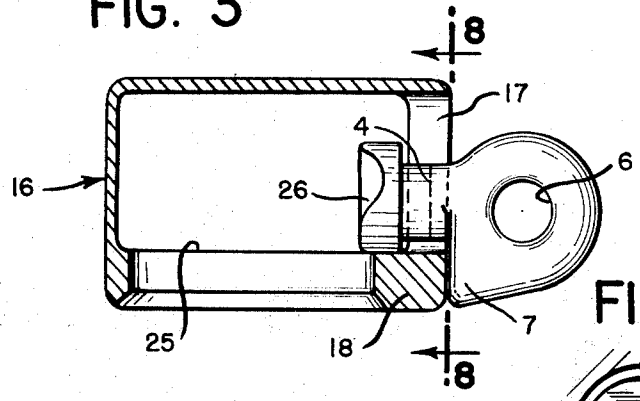


FIG. 6

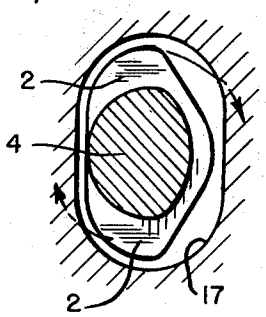


FIG. 7

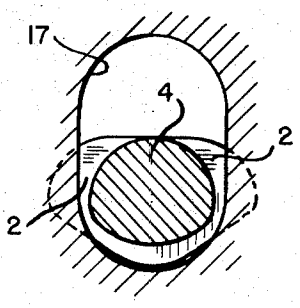


FIG. 8

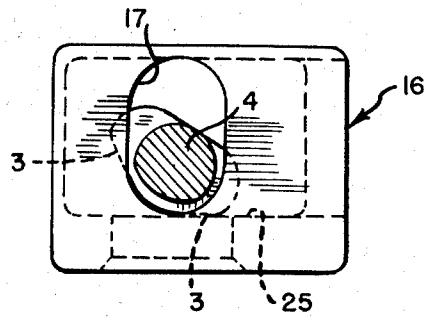


FIG. 4

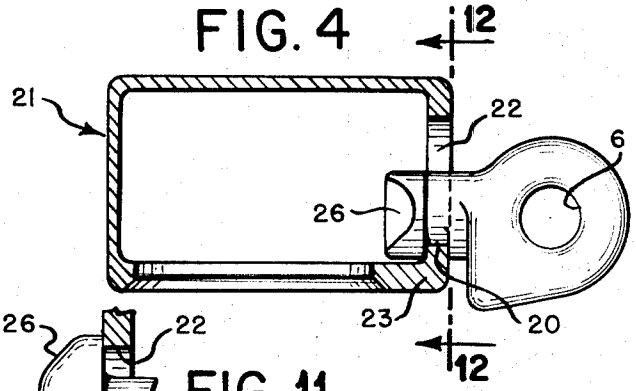


FIG. 9

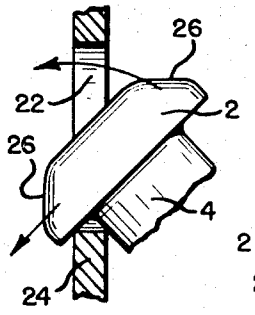
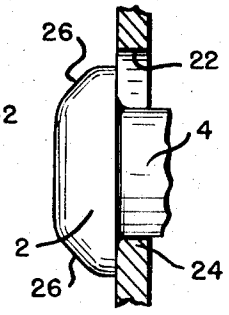


FIG. 10



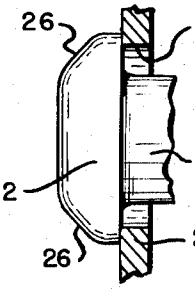


FIG. 11

FIG. 5

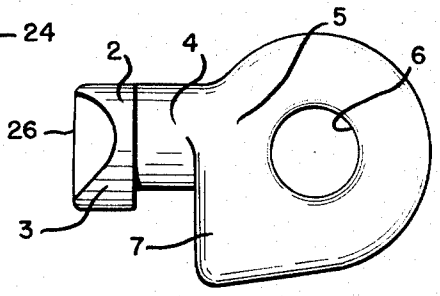
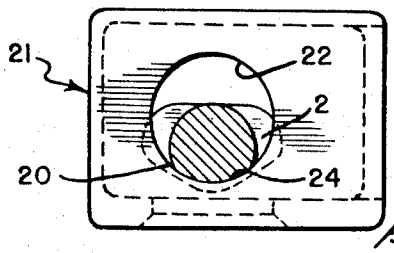


FIG. 12



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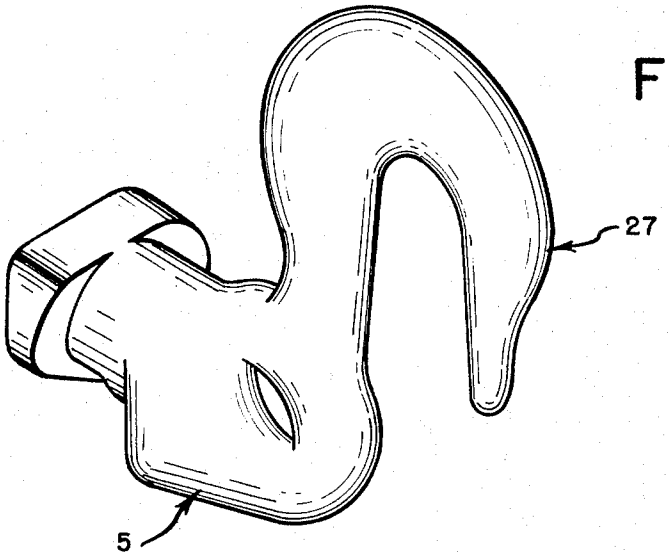
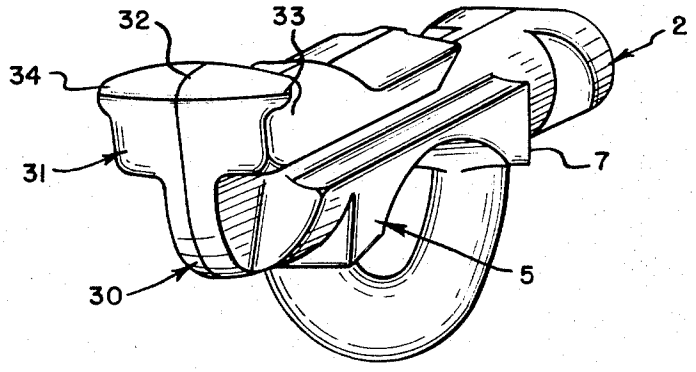


FIG. 13

FIG. 14



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TIE DOWN DEVICE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to tie down devices for use with anchorage members, particularly with fittings, as on the sides and corners of freight containers, to provide securing means. More specifically, it relates to tie down devices having eyelets which, when set in standard three-way corner fittings, project outwardly thereof so that a suitable tie down cable, wire or other lashing means may be attached conveniently through the eyelets.

2. Description of the Prior Art

In the past tie down fasteners with locking notches have been used for hooking up the walls of shipping containers and other structures to a wide variety of securing systems. Prior devices utilizing locking notches, however, have been multifarious and unnecessarily complicated and thus, inherently, have proved to be relatively expensive and time-consuming articles of manufacture. None of the old forms of fastening structures of this genre utilizing the locking notch feature have been constituted of merely a single part. Another shortcoming inhering in such prior devices arises from the propensity of the retaining pins or rivets commonly included in them to disintegrate after sustained use.

Other old forms of tie down devices for use exclusively with special standard hollow corner fittings attached to shipping containers were also comprised of several separable elements. These prior cargo container tie down devices for use with standard corner fittings were liable to slip out of the fitting openings upon untoward rotation of the devices, as when the direction of the tensioning element was changed.

Most important, none of the old forms of attaching means for use with standard corner fittings could readily adapt itself from one kind of fitting to another. Presently, through the efforts of such groups as the American Society of Mechanical Engineers, standardized handling and securing corner fittings for cargo containers are becoming a commonplace. Still, it is perhaps unfortunate that not every corner fitting on today's cargo containers has precisely the same dimensions or offers the same shape of opening. Hole shapes vary from perfectly circular to conspicuously elongate. Wall thicknesses ordinarily also frequently cover a wide range. As a consequence of these seemingly trivial differences in anchorage members, the same securing device that may be suitable for one anchorage member will often prove to be quite useless or at least considerably dangerous when switched to service with another because of a differently shaped hole or a slightly different wall thickness.

SUMMARY OF THE INVENTION

Accordingly, the present invention is designed for use with cargo fittings having variable wall thicknesses and with circular or oblong openings. It has been found that an elongated flange in association with more conventional securing members may be safely retained within the openings of various standard corner fittings, whether circular or oblong and presenting a wide range of web thicknesses. Especially when one or more edges of the elongated flange have been beveled flat, it has been found that the interior side wall commonly found

inside the cavity formed by many standard corner fittings can be used to confine rotation of the securing device so that it is rendered unable to slip out of particularly elongated holes when under load. Furthermore, it has been found that the elongated flange may be combined with a locking notch which hooks on to the web of the fitting for a complementary locking effect.

All in all, it has been discovered that four different locking mechanisms may be exploited by the selfsame device: (1) the elongated flange which engages the inside of the web and thereby is retained within the hole; (2) the beveled surface of the flange held against rotation by the interior side wall situated within the cavity of many standard cargo corner fittings; (3) the integral locking notch which may accept the edges of the webs of some corner fittings; and (4) a flange on the head element of the device which abuts against the exterior wall of the web. It has been found that the same device can exploit at least three of these locking features in a particular application.

Based on this discovery, a tie down device is provided which is adapted to be secured selectively to an anchorage member having a web, the device being selectively operable for use with a web having a circular opening and an elongated opening. An interior side wall is adjacent the opening. The tie down device has three distinguishable elements: a base element, a shank element and a head element. The base element is designed for insertion within the openings under load. In order that the tie down device may not slip out of the elongated opening under load, the base element and its flange are held against rotation by the interior side wall. The dimensions of the base are such that the base can be inserted in the opening, but upon rotation is not removable therefrom. The shank element extends from the base element and has a notch perpendicular to the axis of the shank. The interior side of the notch is formed by the elongated flange of the base portion to which it is thus made parallel and is capable of accepting the edge of webs having appropriate thickness. Finally, there is the head element opposite the base element. Its most characteristic feature is an opening for receiving a part of a tensioning element such as a hook or other connector. The head element also has a flange perpendicular to the axis of the shank and located where the head element abuts the shank element.

At the option of the practitioner of the invention, the locking notch feature may be deleted from the device so that only the bevel-interior side wall lock and elongated flange retention are relied upon, or perhaps even the elongated flange feature along for safe cargo securing means.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a perspective view of a tie down device embodying and constructed in accordance with the invention having an eyelet for receiving a part of a tensioning element;

FIG. 2 is a partial perspective view of a cargo container incorporating the tie down device of FIG. 1 showing its cooperation with lashing means;

FIG. 3 is a partial cross-sectional elevation of a corner fitting having an elongated opening showing the

modification of the tie down device of FIG. 1 in useful position;

FIG. 4 is a partial cross-sectional elevation of a corner fitting having a circular opening showing the embodiment of tie down device of FIG. 1 in position to utilize the integral notch;

FIG. 5 is a perspective view of another tie down device embodying and constructed in accordance with the invention having an eyelet for receiving a part of a tensioning element and having a smooth shank portion;

FIGS. 6–7 are partial cross-sectional views of the embodiment of the invention shown in FIG. 3 showing the procedure for setting the tie down device in place;

FIG. 8 is a cross-sectional view of the embodiment of the invention shown in FIG. 3 taken on the line 8—8 showing how the beveled flange of the invention is held against rotation by the integral interior side wall of the corner fitting having an elongated opening;

FIGS. 9–11 are partial cross-sectional top views of the embodiment of the invention shown in FIG. 4 showing the procedure for setting the tie down device in place.

FIG. 12 is a cross-sectional view of the embodiment of the invention shown in FIG. 4 taken on the line 12—12 of that figure showing how the tie down device of the invention may be retained in a substantially circular corner fitting opening;

FIG. 13 is a perspective view of another tie down device embodying and constructed in accordance with the invention having a hook shaped member extending from the device; and

FIG. 14 is a perspective view of another tie down device embodying and constructed in accordance with the invention having a double end plug hook.

Like numbers refer to like parts in all of the figures.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The invention shown in FIG. 1 is a tie down device in accordance with the invention and comprises a base element 1 including an elongated flange 2 having two bevels 3 along its lower sides. The instant device also comprises a notched shank element 4 which connects the base element 1 with the head element 5. The head element 5 in this embodiment of the invention features an eyelet 6 for receiving an end fitting of a lashing assembly and another flange 7 which prevents the tie down device from being inserted too far into the opening of the corner fitting and also may provide leverage when the elongated flange 2 is being depended upon for locking.

FIG. 2 shows the tie down device in use to secure cargo containers 8 equipped with bottom 9 and top 10 hollow corner fittings having elongated openings 11 whereby the containers are removably secured to lifting or transporting devices by vertical 12 and diagonal 13 lashing means. The bottom corner tie down device 14 offers restraint to both the top and bottom containers 8 and can be used in all bottom corner openings with vertical 12 or diagonal 13 lashing means. The top corner tie down device 15, however, works no restraint upon the top container thereby making lashing of the top container necessary.

In FIG. 3, an embodiment of the present invention as shown in FIG. 1 is depicted in place inside a corner fitting 16. In this embodiment of the invention, the thickness of the web 18 along the bottom and outer end of the corner fitting is such that substantially the entire length of the notched shank element 4 goes through the elongated opening 17 of the web of the anchorage member up to the flange 7 of the head element 5. Here, the shank is not supported on the web. The flange 7 of the head element abuts against the exterior wall of web 18 and the elongated flange 2 abuts against the interior side wall of web 18 so that the tie down device is firmly secured to the anchorage member. Furthermore, the beveled surface 3 of the elongated flange (as shown in FIG. 8) is confined against an interior side wall which prevents the tie down device from rotating out of the opening under load.

The notch-type tie down device can also be used in an anchorage member having a web of a lesser thickness than that shown in FIG. 3. In FIG. 4 the invention is shown in place in a corner fitting 21 which has a circular opening 22. Positioned in this manner, the partially annular recess or notched feature 20 of the invention is utilized. Here, the notch 20 on the shank element is so fashioned as to be supported by the web of the anchorage member. Here, reliance is also had upon two basic features which lock the tie down device to the anchorage member; namely, (1) the elongated flange 2 which is retained against the internal wall of the web; and (2) the web of the anchorage member which fits into the notch in the tie down device and thereby allows the web to support the tie down device. It is noted that in this configuration as compared to the configuration shown in FIG. 3, reliance for supporting the tie down device is partially placed upon the notch 20 and not on the flange 7.

Instead of using the notch-type tie down device shown in FIGS. 3 and 4, a tie down device of the type as shown in FIG. 5 may be used. Here, the shank element 4 is so constructed so that it does not contain a notch and the shank element is substantially smooth throughout its entire length. This device may be inserted through either a circular or elongated opening in the web of the anchorage member. If, for example, this device is used with the thick wall corner fitting as shown in FIG. 3, the device is supported in the anchorage member by the flange 7, the elongated flange 2 and the beveled surface 3 on the elongated flange.

FIGS. 6–7 show a procedure whereby the tie down device as shown in FIG. 1 is inserted into an elongated or oblong opening 17. The tie down device is inserted into the oblong opening by first alligning the elongated flange 2 of the device parallel with the oblong hole 17 as shown in FIG. 6. The elongated flange is then moved into the opening by a longitudinal movement of the device inwardly along the main axis of the device. After this, the device, and therefore, the elongated flange, is twisted approximately 90° such that the elongated flange is retained by the web of the oblong opening as shown in FIG. 7. In this position, the tie down device is supported in the anchorage member by the elongated flange which abuts against the inside wall of the web.

After the tie down device has been inserted through an oblong opening and locked in position by the web of the anchorage member, the device can be subjected to another locking feature. This is accomplished by taking

advantage of the bevels 3 which are on the elongated flange. FIG. 8 shows how this is done. The device is rotated such that the beveled surface abuts against interior wall 25 of the anchorage member. By doing this, the device is prevented from rotating out of the oblong opening under load, thus creating another locking effect.

FIGS. 9–11 show the method by which the tie down device shown in FIG. 4 is inserted through a web of an anchorage member having a circular opening. Insertion of the elongated flange 2 through the circular opening 22 is accomplished by first placing the notched portion of the shank 4 adjacent to the elongated flange on the edge of the web 24 of the corner fitting 21 at an angle as shown in FIG. 9. The device is then moved and positioned inside of the anchorage member by a slight lateral rotation movement as shown in FIG. 9. After this, the device will be positioned in the anchorage member in the manner shown in FIG. 10. To center the device and lock it into position the device is then moved upward and centered as shown in FIG. 11. By this procedure, a larger base flange may be accommodated by a smaller circular opening.

As shown in FIG. 12, the notch 20 acts as a locking feature when hooked onto the web of the corner fitting 21 under load. The elongated flange 2, being retained by the edge of the web 24, acts as an additional locking feature and thus when acting in combination with the locking feature of the notch, prevents the tie down device from removal out of the anchorage member when under load.

To facilitate insertion of the tie down device into openings, in particular, circular openings, bevels 26 can be included on the device. The bevels are found on the bottom side of the base element 1. These bevels are on the surface of the elongated flange 2 opposite the head element 5.

Additional features which may be adapted to every modification of the present invention are shown in FIGS. 13 and 14. FIG. 13 shows the tie down device shown in FIG. 1 which includes a hook 27 which is attached to the head element 5 and projects therefrom. This embodiment of the present invention allows a suitable tie down cable, wire or other lashing means to be conveniently attached to the tie down device through either the eyelet or the hook or both if it is so desired.

FIG. 14 shows a double end plug hook. Here, a second head element 30 is connected to the first head element 5. Located at the end of the second head element is a flange 31 which lies parallel to both the elongated flange 2 and the flange 7 which is on the head element 5. The flange 31 consists of a curved surface 32 having two locking ears 33 and 34 at each end thereof. The cross-section of the arc of the flange is such that it is thinner at the region surrounding the mid-point of the curved flange than at the regions of either of the locking ears. When using this end portion of the double end plug hook, the locking ears are inserted through an opening of a top corner-end of an anchorage member causing the ear portions of the curved flange to engage the inner surfaces of the web of the anchorage member and the entire curved flange to lie flush within the fitting. A tie down device of this type permits a tie down cable, wire or other lashing means, either cross or vertical, to be engaged to an end or side of the top or bottom of an anchorage member.

I claim:

1. A selectively operable tie down device adapted to secure an anchorage member to a support member, the device having a longitudinal axis, the anchorage member having a web with a circular opening or an elongated opening and an interior side wall adjacent the opening, said device comprising:

a. a base member having at least one first elongated flange dimensioned to be insertable into said opening in a first position and movable to a second position whereby the dimensions of said flange exceed the dimensions of said opening to lock said flange within the web against movement out of the web in a direction parallel to the axis of the tie down device;

b. at least one beveled surface in said base member offset from the axis of the tie down device and positioned such that it can be used in cooperation with an anchorage member having an interior surface dimensioned to engage said beveled surface if the device is partially rotated about its axis to preclude further rotational movement of said base member in the direction of rotation;

c. a shank member extending from said base member; and

d. at least a first head member connected to the shank member having means for attaching a tensioning element thereto for securing the anchorage member to the support member.

2. The tie down device according to claim 1 wherein said head member includes a second flange extending substantially perpendicular to the axis of said shank and spaced from said base member such that when a tension force is applied to said head member said second flange will contact an exterior surface of the web and firmly secure the tie down device to the web thereby preventing pivotal movement of the tie down device.

3. The tie down device according to claim 1 wherein the surface of said first elongated flange facing away from the head member has at least one beveled portion to facilitate insertion of the tie down device into a circular opening of a web whereby the base member is inserted into said opening in a first position and moved to a second locking position and the dimensions of said first elongated flange exceed the dimensions of said opening to lock said flange within the web against movement out of the web in a direction parallel to the axis of the tie down device.

4. A tie down device according to claim 1 wherein at least a portion of the surface of said shank element is configured to define a portion of a notch, one side portion of said notch being formed by said first elongated flange of said base member, said notch being configured to receive a portion of the web of the anchorage member such that upon the application of a tension force to said head member, said web member contacts at least a side portion of said notch to facilitate locking engagement of said tie down device to said anchorage member.

5. The tie down device according to claim 19 having a second head member connected to the first head member, said second head member having a third

locking flange portion extending substantially perpendicular to the axis of said tie down device, said second head member adapted for insertion into an opening of a top corner end of an anchorage member such that when a tension force is applied to said first head member, the third locking flange portion engages the web of the corner member and precludes movement of the tie down device out of the top corner end of the anchorage member.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,709,455 Dated February 9, 1973

Inventor(s) Walter A. Last

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In column 6, claim 5, line 1,

"19"

should read

-- 2 -- .

Signed and sealed this 29th day of May 1973.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

FORM PO-1050 (10-69)

USCOMM-DC 60376-P69
* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334.