ABSTRACT: A fastener assembly including a plurality of interfitting elements. One, a stacker fitting, is relatively fixed and cooperates with a laterally insertable key assembly including an expandable wedge lock.
CONTAINER FASTENER MEANS

This invention relates generally to fastener devices, and more particularly to an assembly for securing containers to one another and also to the supporting deck of a transporting vehicle.

The fastener means of the present invention is especially adapted to be utilized in connection with bulk cargo containers which are becoming increasingly popular both in land and sea transportation. Such containers are well known to those skilled in the art and comprise rectangular receptacles designed to be closed on all sides after loading and subsequently handled as a unit, most advantageously from the point of manufacture of the contained commodity to the customer. The proposed fastener utilizes the existent construction found in these conventional containers which includes castings at each of the four top and bottom corners of the containers. These corner castings are isolated from the interior of the container and provide hollow areas usually accessible through openings from both sides of each corner of the casting as well as through an opening in the top or bottom thereof. By the present arrangement a stacker fitting is provided which is inserted vertically into any number of the four corner castings of the container and cooperates with a key assembly inserted laterally into the corner casting to mate with and lock against the stacker fitting which has its base anchored to a transporting vehicle deck or next below cargo container.

Accordingly, one of the primary objects of the present invention is to provide a container fastener means including a stacker fitting and a key assembly for engagement with said stacker fitting.

Another object of the present invention is to provide an improved container fastener means including a stacker fitting engageable with a container corner casting or deck fitting from the exterior thereof and lockable therewith by partially twisting to engage a plurality of lugs forming a part of said stacker fitting.

Still another object of the present invention is to provide a container fastener means including a stacker fitting having a transverse bore for receiving a lateral key assembly, which key assembly is provided with a sliding wedge lock.

A further object of the present invention is to provide a container fastener means including a vertically disposed stacker fitting having a pair of respective transverse bores and cooperated with a transverse lock key disposed through one of said bores and an expandable key bar insertable through the other of said bores.

With these and other objects in view which will more readily appear as the nature of the invention is better understood the invention consists in the novel construction, combination and arrangement of parts hereinafter more fully described, illustrated and claimed.

A preferred and practical embodiment of the invention is shown in the accompanying drawings, in which:

FIG. 1 is a side elevation of a pair of stacked containers secured, by the fastening means of the present invention, both to each other and to a supporting deck.

FIG. 2 is an enlarged vertical sectional view of the present invention taken through a bottom corner casting of one of the containers.

FIG. 3 is a fragmentary vertical sectional view and illustrates an installed and locked fastener means securing two corner castings together on the one hand, and an inserted stacker fitting positioned within another top corner casting and ready for the positioning of an additional bottom corner casting thereupon.

FIG. 4 is a side elevation of a bottom corner casting of a container with the fastening means of the present invention inserted therein.

FIG. 5 is a side elevation, partly in section, of the stacker fitting of the present invention together with its transverse keeper plate.

FIG. 6 is a horizontal sectional view through the line 6-6 of FIG. 5.

FIG. 7 is an end elevation, partly in section, of the stacker fitting of FIG. 5.

FIG. 8 is a horizontal sectional view through the line 8-8 of FIG. 7.

FIG. 9 is a partial top sectional view, through the line 9-9 of FIG. 2, of the key assembly of the present invention.

FIG. 10 is a side elevation of the key assembly of FIG. 9.

FIG. 11 is a transverse sectional view through the line 11-11 of FIG. 10.

FIG. 12 is a vertical sectional view through a bottom corner casting and illustrates a modification of the stacker fitting and key assembly as they appear when in the locked condition.

FIG. 13 is an end view, partly in section, of the assembly shown in FIG. 12.

FIG. 14 is a side view, partly in section, similar to FIG. 12 and illustrating the various components of the fastener assembly as they appear before the key bar is tightened.

FIG. 15 is a transverse sectional view of the structure shown in FIG. 14.

FIG. 16 is a side view, partly in section, of a further modification of the key assembly of the present invention.

FIG. 17 is a side view, partly in section, of a further modification of FIG. 16 as it appears when in the locked condition.

FIG. 18 is an end elevation of the structure of FIG. 16 prior to insertion of the wedge bar.

FIG. 19 is a view similar to FIG. 18 but with the wedge bar secured within the key bar.

Similar reference characters designate corresponding parts throughout the several FIGS. of the drawings.

A typical container shipping arrangement is shown in FIG. 1, wherein it will be seen that a pair of bulk cargo containers C-C are disposed in a two-high stack upon a supporting deck D, which deck may be the bed of a motor vehicle trailer or the deck of a sea-going vessel. The fastener means of the present invention, generally designated F, will be seen to be utilized both to secure the lower portion of the bottom container C to the deck D as well as to secure the upper container C to the lower container C. The primary components of one embodiment of the fastener means F are most clearly illustrated in FIG. 2, and will be seen to comprise a vertically disposed stacker fitting 1 and a transversely positioned key assembly 2, both of which extend into the interior of the container bottom corner casting 3. A discussion of one corner casting will serve to describe the general arrangement of all of the corner castings both as provided on the bottom of a container C as well as on the top thereof. Each corner casting 3 includes an inner cavity 4 which is accessible from the exterior of the container through a pair of side accesses 5 on the one hand, and from a bottom access 6 on the other hand. In the case of the top corner castings 7 the arrangement will be understood to be similar except instead of a bottom access 6 a top access 8 is provided such as shown in FIG. 3.

The construction of the stacker fitting 1 will be most clearly understood upon a review of FIGS. 2, 5-7, wherein it will be seen that the stacker fitting comprises a somewhat elongated structure when viewed in top plan and includes an upper tapered nose 9 extending upwardly from the vertical sidewalls 10 of the midsection which terminate at their lower portion in a special manner to permit the unique twist-to-lock feature of this stacker fitting as it is inserted into a top corner casting 7 prior to locating a cargo container C thereupon.

The bottom and top accesses 6 and 8 in the corner castings 3 and 7, respectively, will be seen to comprise the outline as shown in broken lines in FIG. 6 which outline is substantially congruent to but slightly larger than the elongated shape of the sidewall section 10 of the stacker fitting; however in the area below the sidewall section 10 it will be seen that sloping sidewalls 11 and 12 are provided on the diametrically opposite corners of the stacker fitting (FIG. 6). The two intermediate corners of the lower portion of the stacker fitting are provided on the other hand with laterally extending lugs 13 and 14, each providing a top shoulder 15. From the foregoing it will be seen that by turning the fitting 1 counterclockwise until the lugs 13-14 clear the elongated top access 8 the stacker fitting
may be lowered through the top access 8 of any top corner casting 7 a distance sufficient to permit the two lateral lugs 13–14 to be disposed within the cavity 4 of the top corner casting 7, whereafter a slight clockwise rotation of the stacker fitting places the lateral lugs 13–14 in the position shown in FIGS. 2, 3 and 6 such that upward movement of the stacker fitting is precluded as the two shoulders 15–15 abut the inner walls forming the cavity 4 in the area of the top access 8. Means are provided to prevent the stacker fitting from dropping any further into the cavity 4 comprising a keeper plate 16 which is preferably rectangular and surrounds the stacker fitting in the area of the vertical sidewalls 10. The vertical movement of this keeper plate 16 is limited by attaching a pair of rods 17 to the sidewalls 10 of the stacker fitting such as by welding.

It will be understood that the very same fastening means is employed to secure either the bottommost cargo container C to the supporting deck D as it is utilized to interlock a plurality of stacked cargo containers to each other. In order to secure the lowermost or bottom corner castings 3 of the lower cargo container C to a deck D it will be understood that it is only necessary to provide on the deck sufficient structure such as shown by the deck fitting 18 in FIG. 2 in order to attach the stacker fitting 1 as shown. The deck fitting thus includes a cavity 19 disposed in the top access 18. When the desired number of stacker fittings 1 have been positioned within the deck fittings 18, these fittings are then ready to receive the first cargo container C which may be lowered into position over the upstanding tapered noses 9 of the stacker fittings. As the cargo container is lowered, by any suitable material handling apparatus, it will be evident that the positioning of the bottom corner castings 3 of the lower cargo container C will be facilitated by the tapered noses 9 of the upstanding stacker fittings as these tapered portions are guided into the bottom access openings 6 of the lowermost cargo container. With the cargo container thus placed, it is firmly secured into position by insertion of the key assembly 2 through the appropriate side access of the bottom corner casting 3, whereupon the assembly will appear as in FIG. 2.

Each key assembly 2 comprises a vertically expandable key bar 19 which is normally laterally slidable by insertion through the transverse bore 20 provided in the upper portion of the stacker fitting. This bore 20 is bounded at the top by the head 9u of the nose 9 and at the bottom by the sidewalls 10 of the fitting. The key bar 19 accounts for the stacker fitting by precluding any one-half vertical separation of the key assembly 2 while the other half thereof comprises and integral screw shank 21. The undersurface of the key bar 19 is provided with a longitudinal recess 22 having a downwardly facing inclined cam surface 23 as shown most clearly in FIG. 3. Disposed within this recess 22 is a sliding wedge lock 24 having an upper ramp surface 25 engageable with said cam surface 23. Elongated transverse slots 26 are provided in the sides of the sliding wedge lock 24 and will be seen to be disposed with their longitudinal axes parallel to the aforementioned cam surface 23 and ramp surface 25.

This wedge lock 24 is retained within the recess 22 by means of a fixed lock pin 27 anchored through each side of the key bar 19 and extending into the adjacent slot 26. In view of the foregoing structure it will follow that upon relative parallel movement between the surfaces 23 and 25 the top edge 20 of the key bar 19 and lower edge 29 of the wedge lock 24 will be moved vertically to or from another, depending upon the direction of travel of the key bar 19 with respect to the captive wedge lock 24.

It is evident from the foregoing structure in mind, it will be understood that as the key assembly 2 is inserted through the side access 5 and into the transverse bore 20 of the stacker fitting as shown in FIG. 2, the downwardly projecting lower edge 29 of the sliding wedge lock 24 will drop into the bottom access 6 of the corner casting 3 while the two lateral adjacent portions of the lower surface of the wedge lock 24 will rest upon the upper surface of the lower plate forming this corner casting. In order to vertically expand the key bar 19, suitable nut means 30 positioned upon the free end of the screw shank 21 is manipulated. A washer plate 31 will be seen to be positioned adjacent the nut 30 and is of a lateral dimension substantially greater than the lateral dimension of the side access 5 as shown most clearly in FIG. 4 of the drawings so that as the nut 30 is tightened it will engage and expand the key bar 19, its integral key bar 19 will be urged outwardly in the direction of the side access 5, which movement will cause expansion of the key bar 19 due to the immovable status of the wedge lock 24. This expansion will follow as the lockpin 27 carried by the key bar 19 and moved toward the side access 5 and thus travel upwardly through the elongated slots 26 in the wedge lock 24, moving the top edge 28 of the key bar toward the uppermost limit of the transverse bore 20 formed by the head 9u of the stacker fitting. Continued tightening of the nut 30 will provide equal force urging the top surface 28 of the key bar upwardly toward the head 9u of the stacker fitting as well as the lower edge 29 of the wedge lock 24 downwardly against the bottom plate of the corner casting while the limit of the resultant upward displacement of the stacker fitting will be determined by the abutment of the lug shoulders 15–15 against either the deck fitting 18 or top casting 7.

When it is desired to disconnect the container fastener means the preceding sequence is merely reversed. The nut 30 is loosened a sufficient distance to permit movement of the key bar 19 and shank 21 inwardly so as to move the cam surface 23 along the ramp surface 25 which will lower the top edge 28 of the key bar, thus permitting easy withdrawal of the entire key assembly 2 from the transverse bore 20 of the stacker fitting and through the side access 5 of the corner casting whereupon when all of the fastener means for any one cargo container C have been thus released, the cargo container will then be free to be lifted upwardly from the vertically projecting stacker fittings 1.

A modified form of fastener means is illustrated in FIGS. 12–15 which fastener is intended to be utilized with the very same type of container casting as that described heretofore. In this embodiment the stacker fitting 32 is provided with a longitudinal bore 33 on the one hand, as well as a transverse bore 34 on the other hand. The longitudinal bore 33 is bounded at its upper portion by the head 35 of the stacker fitting 32 and at its lower portion by the top of the end walls 36 of the fitting. As most clearly shown in FIG. 14 the transverse bore 34 has its upper portion disposed in a plane which passes through the intermediate bottom of the longitudinal bore 33 while the bottom of the transverse bore 34 is disposed in a plane well below the top of the stacker fitting end walls 36–36. It will be understood that the stacker fitting 32 may be constructed in the same manner as the stacker fitting 1 in the area of its lower extremity so as to provide for the twist-to-lock feature previously described. This construction includes the pair of lateral lugs 37 and 38 (FIG. 15) provided to engage the top corner casting 7 (or a deck fitting) adjacent a top access opening.

For a more permanent type of installation the use of separate deck fittings 18 for attaching the stacker fittings may be eliminated and a plurality of stacker fittings may be attached such as by welding directly to a vehicle bed or deck such as in FIG. 12 wherein it will be seen that a stacker fitting 32 is provided with an integral deck plate 39. In any case, whether the fixed type of stacker fitting, as shown in FIGS. 12–13 is utilized, or the removable twist-to-lock type, as shown in FIGS. 14 and 15 is chosen, the manner of attaching the key assembly 40 will be identical. After placement of a bottom corner casting 3 upon the uppermost stacker fitting 32 a transverse lock key 41 is introduced through one of the side access 5 and through the transverse bore 34 of the stacker fitting such as shown in FIG. 15. When thus positioned the lower edge 42 of the lock key 41 will be disposed within the bottom access 6 of the casting 3. The next step is to insert the key assembly 40 through the other side access 5 and of the casting 3 with the key bar 43 and its sliding wedge lock 44 disposed within the longitudinal bore 33. The wedge lock 44 as used with the key assembly 40 operates in a manner similar.
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to the wedge lock 24 of the key assembly 2, however is provided on its lower surface with a notch 45 as most clearly shown in FIG. 14. When properly positioned the notch 45 straddles the transverse lock key 41 and this point the fastener assembly is tightened by manipulation of the nut means 46 carried by the threaded shank 47. As the nut means 46 is tightened the key bar 43 drawn downward toward the nut means, the opposed inclined surfaces 48 and 49 of the key bar and wedge lock, respectively, cooperate to expand from the position shown in FIG. 14 to that illustrated in FIG. 12 wherein the top 50 of the key bar 43 will engage the head 35 of the stacker fitting on the one hand, while the lugs 37-38 or the deck plate 39 is urged toward the bottom corner casting 3 to secure the container in position.

An alternative manner of securing the key assembly in position is illustrated in Figs. 16-19 wherein it will be seen that the threaded screw shank of the key bar has been eliminated. In this embodiment the key assembly 51 includes a shank 52 having a transverse bore 53 of tapered construction; that is, provided with at least one inclined sidewall. When the bottom corner casting 3 is in position about a previously installed stacker fitting and the key assembly 51 has been properly positioned through the transverse bore of the stacker fitting, the fastening assembly is tightened by the insertion of a wedge bar 54 having inclined opposite side edges into the bore 53 in the shank 52 as illustrated in FIG. 16 of the drawings. It will be seen that as the wedge bar 54 is driven by any suitable means, such as a sledge, from the position of FIG. 16 to that shown in FIG. 17 the key bar assembly will be urged outwardly to expand into the same locked position. Any suitable means such as the chain 55 may be provided to act as a tethers for the wedge bar 54 thereby insuring that the wedge bar will always be proximate to the key bar both prior to and following assembly of the key assembly with a stacker fitting.

When using either of the key assemblies 2 or 40 with the respective stacker fittings 1 and 32, an important feature should be understood which permits ready insertion and removal of the stacker fittings without binding yet insures a positive and rigid tightening of the completed assembly to preclude any lateral shifting of the containers even in the case of a shipboard installation which may involve deck rolling of as much as 35 degrees in heavy weather conditions. The keeper plate 16 is slidably disposed around the fitting sidewall 10 and thus limited in its vertical movement by rods 17 which mate with the plate grooves 17a to provide a substantially flush top plane as shown in the unlocked condition of FIG. 2. In this view a slight clearance 15a exists between the top shoulders 15-15 and the juxtaposed undersurface of the casting as the fitting rods 17-17 rest by gravity within the grooves 17a-17a. Upon insertion of the key assembly and following tightening thereof, the wedge lock elevates the fitting, thus raising the top shoulders 15-15 to engage the casting and secure the containers against vertical and lateral displacement. During the tightening operation the floating keeper plate 16 remains stationary as the fitting is raised with the result that the fitting rods 17-17 are slightly elevated from the bottom of the plate grooves 17a-17a as will be seen in the locked condition illustrated in the lower portion of FIG. 3. The chamfer surrounding the bottom access 6 also prevents any interference between the rod displacement and the bottom of the bottom casting 3.

1 claim:
1. Fastener means for securing a container provided with bottom corner castings to a lowest positioning surface, said casting each having a cavity including a side access and a bottom access, said means comprising, a stacker fitting secured to said supporting surface and provided with an upstanding nose portion and a horizontally disposed bore therethrough, said container casting adapted to be positioned upon said supporting surface with said fitting nose portion disposed through said bottom access and within said cavity, said fitting bore axially aligned with said casting side access, a key assembly including a shank and key bar disposed through said side access with said key bar positioned within said fitting bore, vertically expandable means carried by said key bar projecting downwardly from the bottom thereof juxtaposed said casting bottom access and operable upon axial displacement of said key assembly to urge said fitting upwardly while urging said casting downwardly against said supporting surface, said expandable means including means providing within said casting bottom access to prevent axial displacement of said expandable means during axial displacement of said shank and key bar, and means engaging said shank to axially displace said key assembly.
2. Fastener means according to claim 1 wherein said stacker fitting includes a vertical sidewall below said nose portion, a lateral lug extending from the lower portion of said sidewall to provide a top shoulder, and said supporting surface includes a top access of a transverse dimension normally less than that of said fitting lug, whereby, said fitting is secured to said supporting surface by first inserting said lug through said top access and then twisting said fitting to lock said lug beneath said supporting surface.
3. Fastener means according to claim 2, wherein said fitting is elongated in transverse section through said sidewall and includes a pair of said lugs.
4. Fastener means according to claim 2, wherein said fitting is provided with a keeper plate surrounding said sidewall and means on said fitting limiting the vertical displacement of said plate.
5. Fastener means according to claim 1, wherein said fitting nose portion is tapered toward its free end to facilitate alignment thereof with said bottom access when said container is positioned upon said supporting surface.
6. Fastener means according to claim 1, wherein said key assembly shank is threaded and said displacing means thereon is a thread nut.
7. Fastener means according to claim 1, wherein said key assembly shank includes a transverse tapered bore and said displacing means thereon is a tapered wedge bar.
8. Fastener means according to claim 1, wherein said expandable means includes a sliding wedge lock carried by said key bar, said wedge lock having a top ramp surface, and an inclined cam surface on said key bar engaging said ramp surface, whereby relative movement of said ramp surface and cam surface vertically displaces said wedge lock with respect to said key bar.
9. Fastener means according to claim 1, wherein said stacker fitting includes a second horizontally disposed bore having its axis normal to said first bore, a second side access to said cavity disposed normal to said first side access, a transverse lock key disposed through one said side access and said second fitting bore, and said key bar disposed through said first bore and over said lock key.
10. Fastener means according to claim 9, wherein said expandable means includes a sliding wedge lock carried by said key bar, said wedge lock having a top ramp surface, and an inclined cam surface on said key bar engaging said ramp surface, whereby relative movement of said ramp surface and cam surface vertically displace said wedge lock with respect to said key bar.
11. Fastener means according to claim 10, wherein said wedge lock is provided with a notch on its lower edge and said notch straddles said lock key.
12. Fastener means according to claim 4, wherein said limiting means engages said keeper plate following insertion of said fitting through said top access and said lug is spaced from said supporting surface whereby actuation of said vertically expandable means on said key bar raises said fitting together with its limiting means and lug.