United States Patent [19]

Link et al.

[11] **3,872,555**

[45] **Mar. 25, 1975**

[54] **FREIGHT CONTAINER COUPLER**

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[73] Assignee: **Value Engineering Company,** Alexandria, Va.

[22] Filed: **May 12, 1972**

[21] Appl. No.: **252,668**

[52] **U.S. Cl.** ..... **24/221 R,** 214/10.5 R, 220/1.5

[51] **Int. Cl.** **B65j 1/22**

[58] **Field of Search** ..... 294/67 R, 67 DA, 67 DB, 294/81 R; 24/221 R, 221 K; 214/10.5 R, 38 CA; 296/35 A; 220/1.5, 6, 7, 23.4, 23.6, 97 R, 97 B; 248/361 R; 105/366 B, 366 C

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Primary Examiner—Frank E. Werner

Attorney, Agent, or Firm—Edmund M. Jaskiewicz

[57] **ABSTRACT**

A freight container having hollow corner fittings with openings therein is provided with a horizontal coupler positioned within the container adjacent to a corner fitting. The coupler has a housing mounted adjacent an opening in the corner fitting and a bolt lock assembly is axially displaceable within the housing. A bolt lock on one end of the assembly is pivotable between locking and unlocking positions. A portion of the bolt lock assembly is threaded and has a ratchet drive mounted thereon for extending and retracting the assembly to project the bolt lock through the fitting openings outwardly of the container to enable the bolt lock to engage with a similarly shaped opening in an adjacent container. The bolt lock is fixed on a rod mounted rotatably in an axial bore of the assembly and a lever is provided on the other end of the rod for pivoting the bolt lock between locking and unlocking positions. A vertical coupler is also disclosed which has a similarly shaped bolt lock positioned in an assembly which is extendable and retractable with respect to the container face by means of an operating handle. Pivoting of the operating handle also moves the bolt lock between locking and unlocking positions.

2 Claims, 11 Drawing Figures

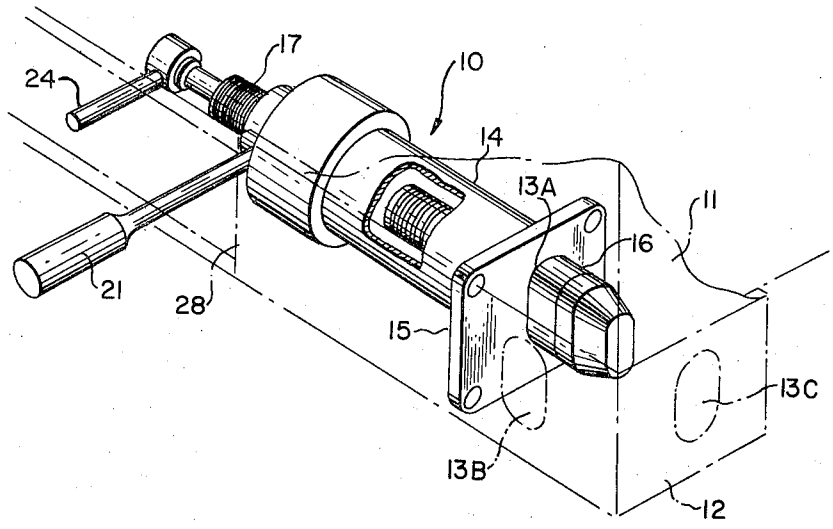
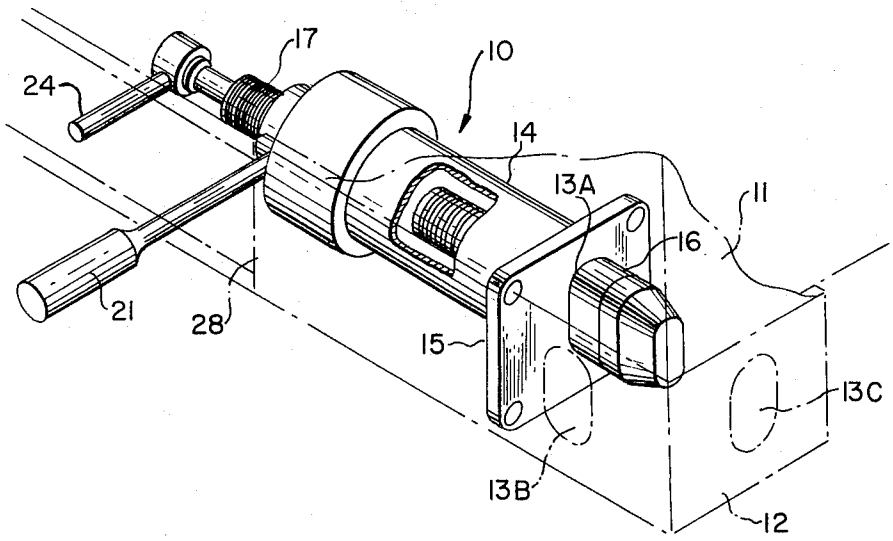


FIG. 1



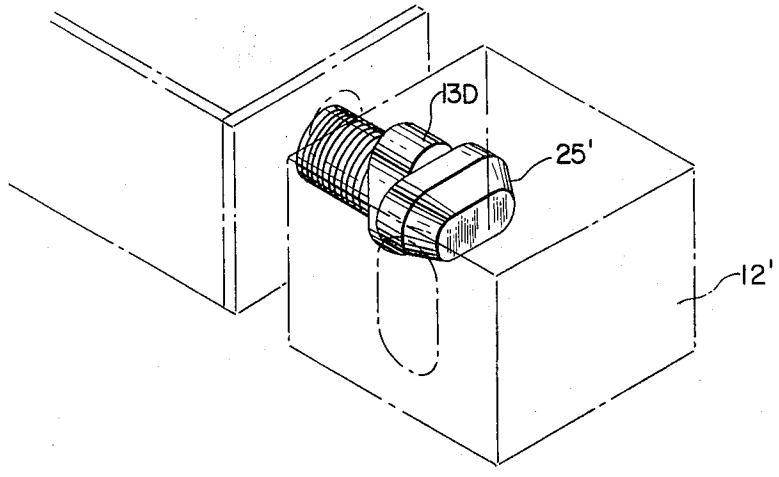


FIG. 2

FIG. 3

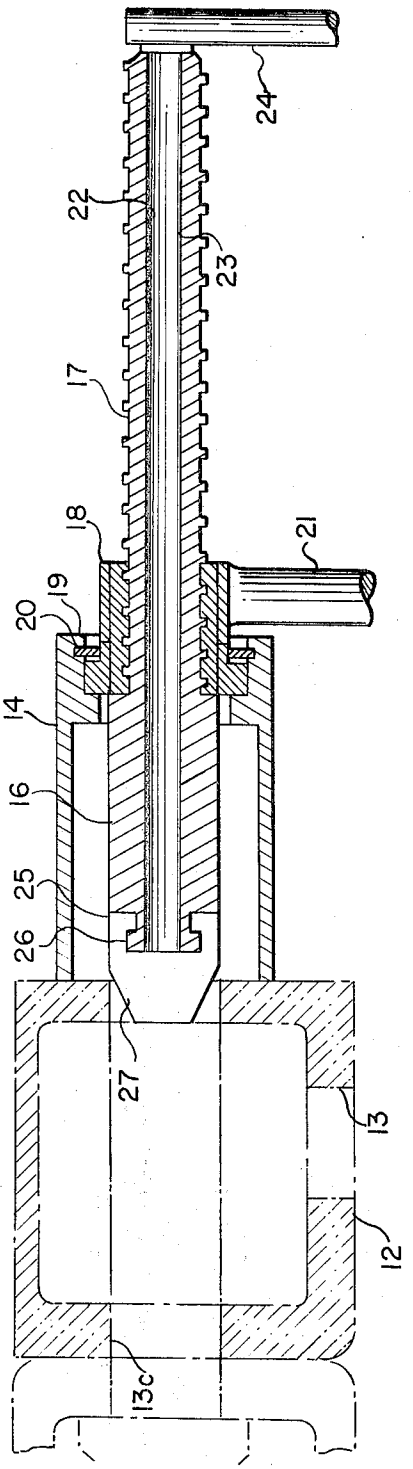


FIG. 4B

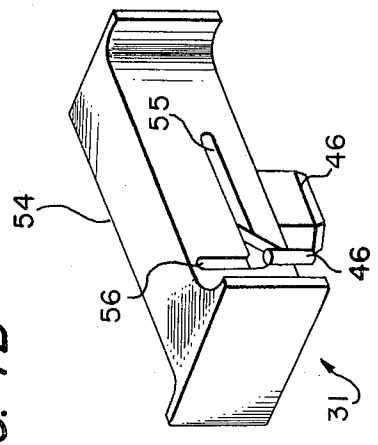
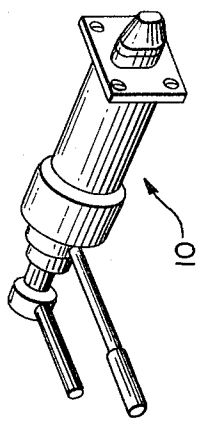


FIG. 4A



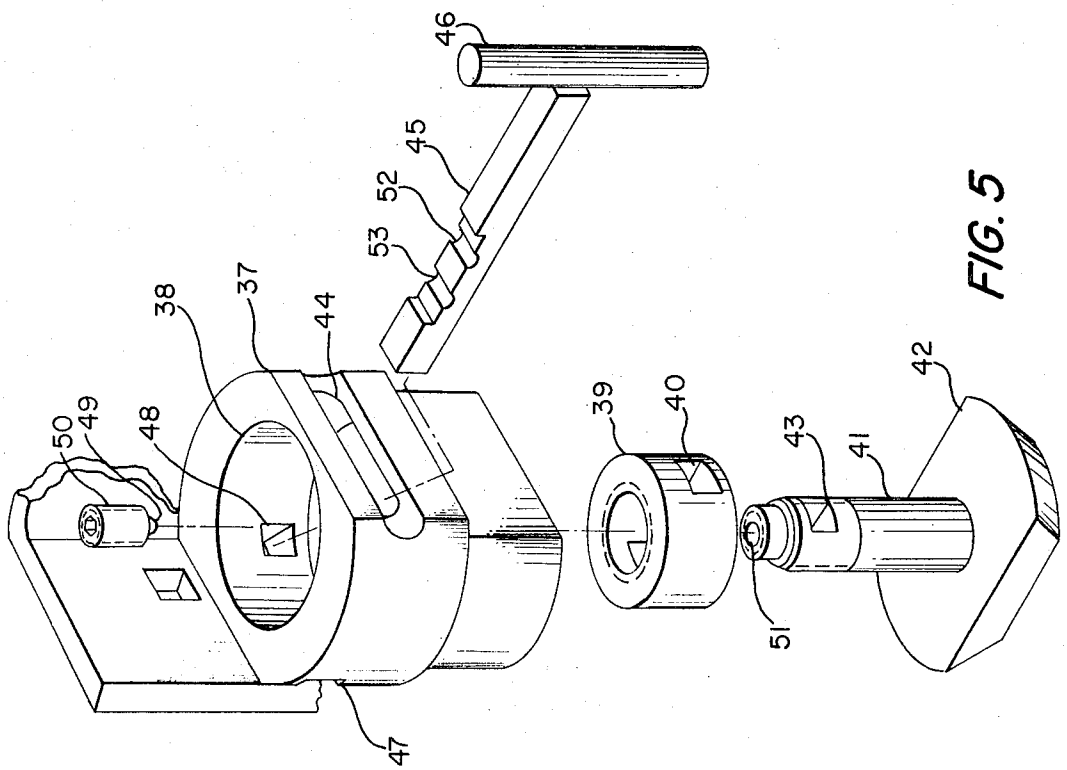

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47

FIG. 5

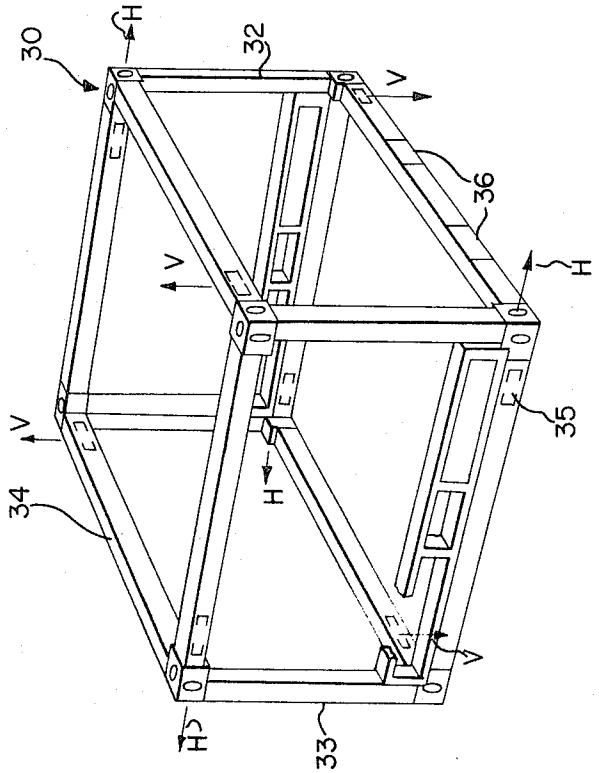

30
H
32
V
36
H
V
V
35
34
H
H
33

FIG. 4

FIG. 7

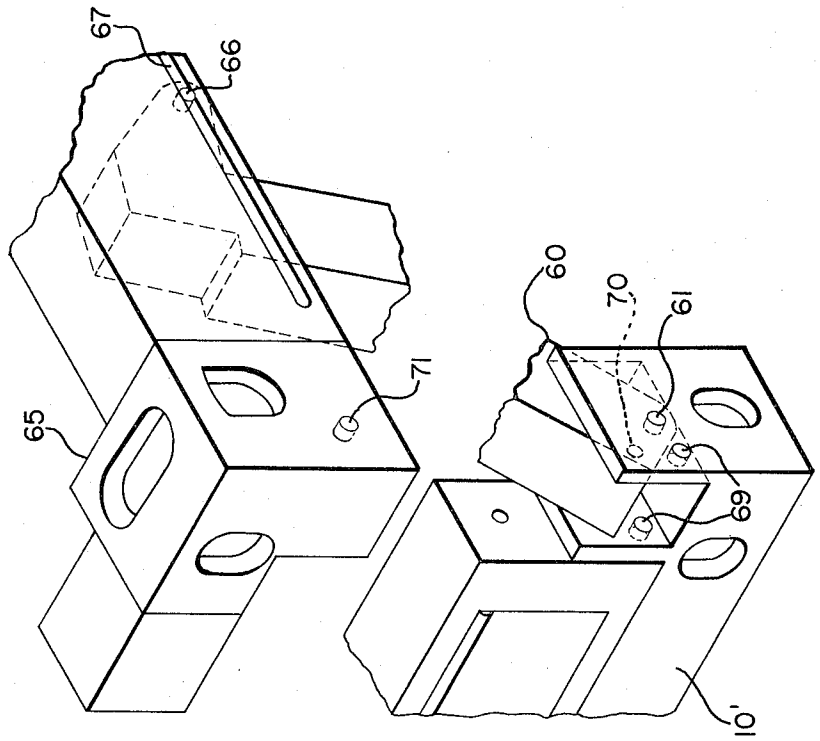
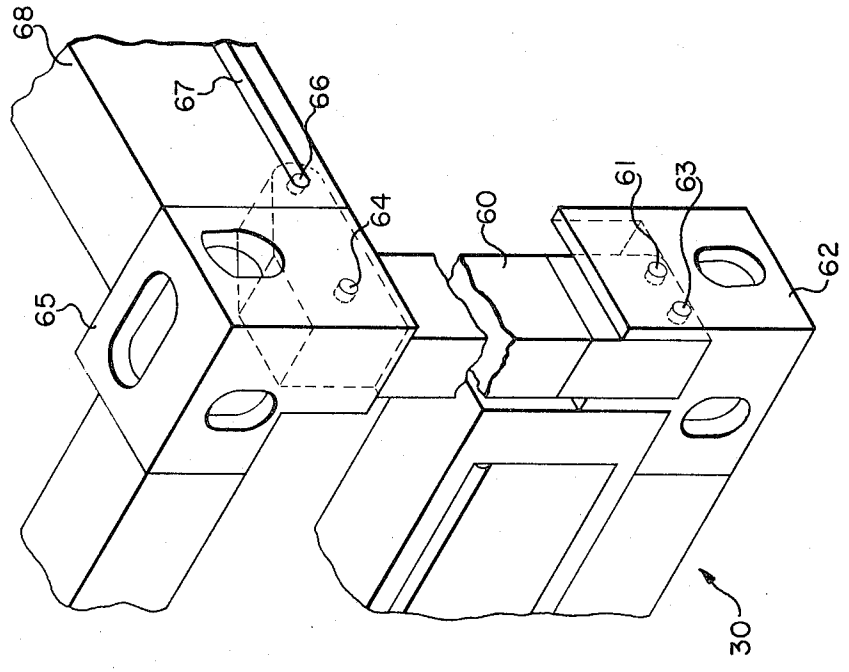


FIG. 6



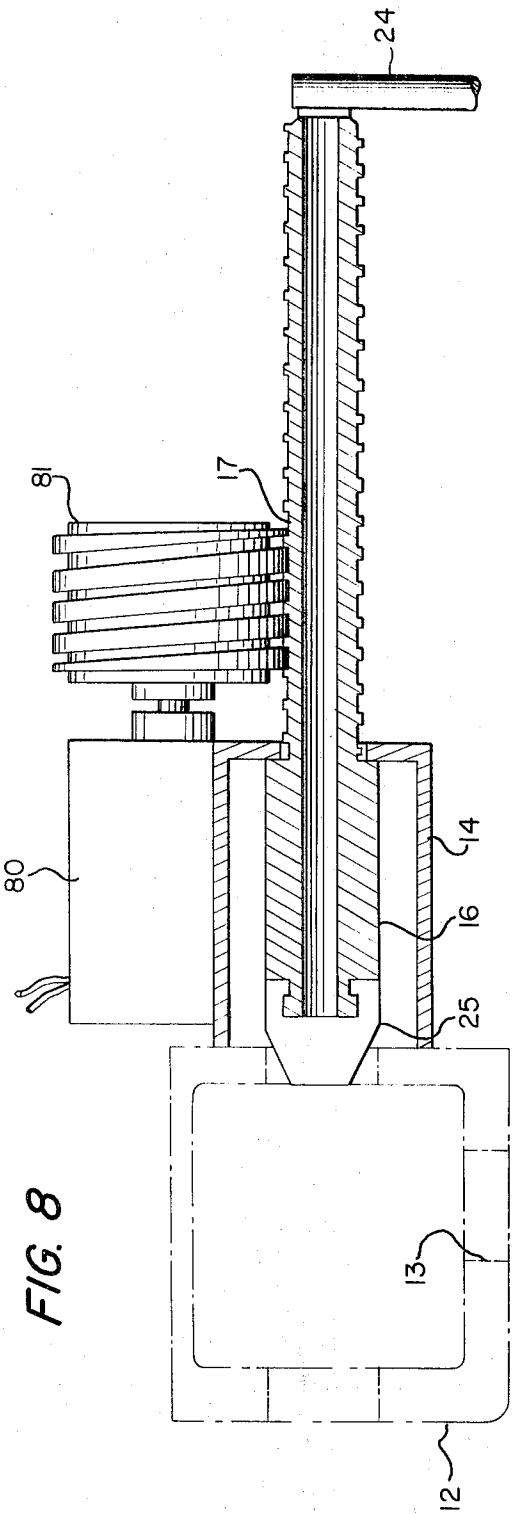


FIG. 8

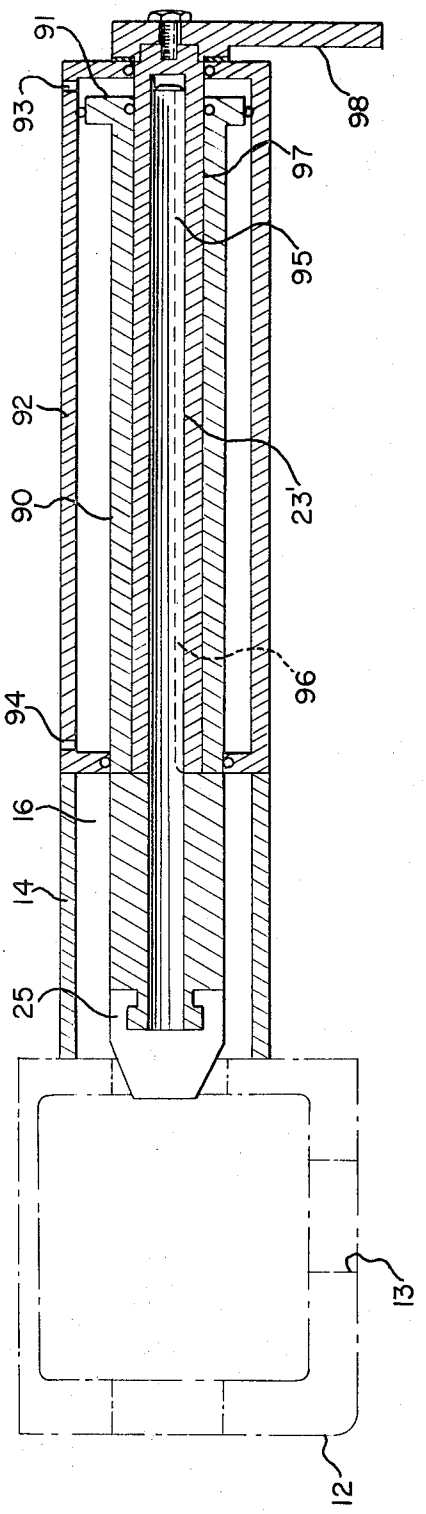


FIG. 9

FREIGHT CONTAINER COUPLER

The present invention relates to a coupler for freight containers, more particularly, to horizontal and vertical couplers which not only can be lockingly engaged with an adjacent container but which also can be extended and retracted with respect to the container in which they are mounted.

In domestic and international shipment of a wide variety of cargo increasing use is being made of cargo or freight containers. Such containers permit the transport of cargo in large unit loads and thus facilitates and expedites the handling of these cargos during shipment. These containers are generally formed of metal or plastic so as to be of a permanent character and sufficiently strong for repeated use. The size and shape of such containers have become standardized in order to facilitate the carriage of goods by two or more modes of transportation without intermediate reloading. Also, these containers are provided with features to permit ready handling and transfer from one mode of transport to another.

In order to facilitate the handling of containers standardized fittings are now provided on the corners of the containers. The corner fittings essentially comprise a hollow cube-shaped member having openings in several of the faces thereof so that a hook, cleavis or other rigging device can be inserted through the openings to handle the container. These standardized corner fittings also permit a coupling together of two or more containers in vertical or horizontal relationship in order to form a larger unit load. Various forms of container couplers have been proposed but such known couplers have not been satisfactory and have not been generally accepted for use. Such couplers generally had the disadvantage that they were too complicated in structure, were susceptible to being broken or damaged to the extent of being inoperative, or could not be readily manipulated during the coupling and uncoupling operations. Simple couplers comprising merely separate coupling elements for interconnecting containers have been proposed but the use of such coupling elements has not been wide spread since these coupler elements have been misplaced or lost when separated from the containers and thus are not available when desired to couple containers together.

It is therefore the principal object of the present invention to provide a novel and improved coupler for freight containers.

It is another object of the present invention to provide both horizontal and vertical couplers for freight containers wherein the couplers are simple in structure, easily operable and are permanently mounted within the containers so as to be always available for coupling operations.

It is a further object of the present invention to provide an arrangement of horizontal and vertical couplers on a freight container which will permit the freight container to be always coupled to a vertically or horizontally adjacent container or with the devices provided in different modes of transportation.

It is an additional object of the present invention to provide a coupler particularly adapted for freight containers incorporating apertured corner fittings at the corners thereof.

The disadvantages and problems of the prior art as described above are eliminated and the objects of the

present invention are achieved by the freight container coupler dislosed herein. A freight container is provided in each corner thereof with a hollow cube-shaped corner fitting which has a plurality of openings on a corresponding plurality of sides. A coupler housing is mounted within the container adjacent an opening of the corner fitting and a bolt lock assembly is positioned for axial displacement within the housing. A bolt lock is on one end of the bolt lock assembly and is pivotable between locking and unlocking positions. Means are provided on the housing for extending the bolt lock assembly outwardly of the container through a corner opening and through an opposed opening so that the bolt lock is engageable in a similar opening in a corner fitting in an adjacent container. The same means are employed for retracting the bolt lock assembly so that the bolt lock is withdrawn inwardly of the corner fitting and thereby pulling adjacent containers together. Means which may comprise a lever are provided on the bolt lock assembly for pivoting the bolt lock between its locking and unlocking positions.

Another form of coupler which is particularly adapted for vertical coupling may also be mounted at the corner of a container but inwardly of the corner fitting. The vertical coupler also comprises a bolt lock assembly and a bolt lock with the bolt lock assembly similarly being extendable and retractable with respect to the frame.

The horizontal and vertical couplers may be mounted on diagonally opposed corners of a face of a container in such a manner so that only one coupler, either a vertical or horizontal coupler, is at a corner of the container.

A collapsible frame for a freight or liquid container may be formed of a plurality of frame members which are pivotally and/or attachably connected to each other to permit collapsing of the frame when not in use. The horizontal and vertical container couplers of the present invention can also be incorporated at the corners of these frame members for coupling to similar collapsible containers.

Other objects and advantages of the present invention will be readily apparent upon reference to the accompanying description when taken in conjunction with the following drawings, which are exemplary, wherein;

FIG. 1 is an overall perspective view of a horizontal container coupler according to the present invention mounted adjacent the corner fitting of a freight container;

FIG. 2 is an overall perspective view showing the manner in which the coupler in FIG. 1 is extended to lockingly engage the corner fitting of an adjacent container;

FIG. 3 is a longitudinal sectional view of the coupler of FIG. 1;

FIG. 4 is an overall perspective view of a frame for a container and showing the positioning of horizontal and vertical couplers thereon;

FIG. 4A is an overall perspective view of the horizontal coupler mounted in the frame of FIG. 4;

FIG. 4B is an overall perspective view of a vertical coupler mounted on the frame of FIG. 4;

FIG. 5 is an exploded perspective view of a vertical container coupler according to the present invention;

FIG. 6 is a perspective view of one edge of the frame of FIG. 4 in enlarged scale and a portion of the vertical

support cut away showing the members in locked position;

FIG. 7 is a view similar to that of FIG. 6 but showing the members in collapsed position;

FIG. 8 is a longitudinal sectional view of a modified container coupler having an electric motor to extend and retract the bolt lock; and

FIG. 9 is a view similar to that of FIG. 8 of a further modification wherein the coupler is provided with a fluid pressure motor for extending and retracting the bolt lock.

Proceeding next to the drawings wherein like reference symbols indicate the same parts throughout the various views a specific embodiment and modifications of the present invention will be described in detail.

As may be seen in FIGS. 1 and 2, a horizontal container coupler according to the present invention is indicated generally at 10 and is mounted adjacent a corner of a freight container 11 only a portion of which is shown in FIG. 1. The freight container 11 is provided with a corner fitting 12 of the ISO type which is essentially a hollow cube-shaped member having a plurality of eliptical openings 13B and 13C. The openings are intended particularly to receive various rigging devices. An opening 13A is provided for the coupler bolt.

The coupler 10 is positioned adjacent the corner fitting 12 adjacent the corner of the container and comprises a coupler housing 14 which may be attached directly to the corner fitting by means of a flange 15 or an integral part of the ISO type corner fitting.

As can be seen in FIG. 3, a bolt lock assembly 16 is mounted within the housing for axial displacement therein and comprises a threaded portion 17 which projects outwardly of the housing as may be seen in FIG. 2 when the coupler bolt is in the retractable position. The thread may comprise an Acme thread. A ratchet drive 18 is mounted in the outer end 19 of the housing and is secured therein by a retainer 20. The ratchet drive is provided with a handle 21 and suitable adjustment lever structure for reversing the operation of the ratchet as well known in the art. The ratchet drive is in driving relationship with the threaded portion 17 so that actuation of the ratchet drive will cause axial movement of the bolt lock assembly.

The bolt lock assembly is provided with an axial bore 22 extending therethrough in which is rotatably positioned a bolt lock rod 23. One end of the rod 23 projects outwardly of the bolt lock assembly and has a bolt lock lever 24 affixed thereon so that movement of the lever will pivot the rod within the assembly.

At the other end of the rod 23 is secured a bolt lock 25 rotatably mounted on a flange 26 formed in the end of the bolt lock assembly 16.

The cross-section of the bolt assembly is substantially elliptical as can be seen in FIG. 1 so as to fit closely within the corner fitting openings 13. The bolt lock 26 has a similar cross section so as to constitute an extension of the bolt lock assembly but is also provided with a tapered nose 27 to facilitate insertion into the corner fitting openings of an adjacent container.

A longitudinal slot 28 is formed in a face of the container adjacent the corner fitting as shown in FIG. 1 so that both the ratchet handle 21 and bolt lock lever 24 are accessible through this slot. The slot is of sufficient length to accommodate both levers when the coupler is in its retracted position. The bolt lock lever may be of such a length so as to be positioned within the outline of the container. The ratchet handle 21 may be longer to facilitate actuation of the ratchet drive but the handle may be made telescoping or retracting so that the ratchet handle also may be positioned within the outline of the container when the coupler is not in operation. By positioning these operating levers within the outline of the container they are protected from damage during transportation. Further, both operating levers are permanently secured to the coupler so that whenever it is desired to operate the coupler the operating levers will always be present.

In its normal retracted position, the bolt lock 25 is retracted inwardly of the corner fitting 12 so that the openings 13B and 13C can be used with rigging devices. In operation, the bolt lock assembly extends and retracts without rotation. Actuation of the ratchet drive will cause the bolt lock assembly to move to the right as viewed in FIG. 2 until the bolt lock extends outwardly of opening 13C. The bolt lock can then be extended further for insertion into corresponding opening 13D as shown in FIG. 2 of the corner fitting 12' of an adjacent horizontally positioned container. When the bolt lock has been completely inserted into the opening 13D, the bolt lock lever 24 is pivoted through an angle of 90° to pivot the bolt lock to the position 25' as shown in FIG. 2. The bolt lock is thus lockingly secured behind the corner fitting opening 13D. At this time, the bolt lock assembly can be retracted so that the corner fittings 12 and 12' and accordingly the respective containers are pulled close together.

In FIG. 4 a frame for a cargo (freight or liquid) container in the form of a fuel module is indicated generally at 30. This type of a fuel module generally comprises a collapsible frame which is enclosed by a rubber or other flexible casing for containing the fuel. The flexibility and resiliency of the rubber casing permits collapsing of the frame so that the entire fuel module occupies a minimum of space when not in use.

The frame 30 is provided with both horizontal couplers 10 and vertical couplers indicated generally at 31 and shown in FIG. 4B. The arrows H and V in FIG. 4 represent horizontal and vertical couplers respectively and illustrate the manner in which horizontal and vertical couplers are positioned on the faces of a cargo container to enable the container to be coupled to a horizontally or vertically adjacent similar container, regardless of the position relationship between them. One face of the container frame is indicated at 32 and has a pair of horizontal couplers H mounted in diagonally opposite corners thereof. The face opposed from face 32 and indicated at 33, similarly has a pair of horizontal couplers H mounted in diagonally opposite corners but in the other pair of corners so that the horizontal couplers of the faces 32 and 33 are non-opposite from each other.

The same arrangement of vertical couplers V is provided on upper face 34 and lower face 35.

It will be apparent from FIG. 4 that the vertical couplers 31 are positioned inwardly of the corner fittings and engage with correspondingly shaped and positioned openings on the next vertically adjacent container, either above or below.

The frame 30 is provided with fork lift pockets 36 on both faces 32 and 33 to permit two-way access to such a container.

The vertical coupler 31 comprises a bolt lock assembly which is shown in greater detail in FIG. 5. The bolt

lock assembly comprises a tubular body **37** having a central bore **38** within which is rotatably mounted a ring **39** having a diametrical opening **40** therethrough. A rod **41** having a bolt lock **42** on an end thereof is received within the ring **39** and at its upper end also has a diametrical passage **43.**

The coupler assembly body **37** is provided with a transverse opening **44** in a wall thereof through which is inserted an operating lever **45** having a rectangular cross-section closely conforming to the cross-sections of the passages **40, 43** and **48.** The outer end of the operating lever is provided with a handle **46.**

Also in the wall of the body **37** are openings **47** and **48** which are for the purpose of receiving the end of the operating lever **45.** A spring biased ball detent **49** is housed in an enclosure **50** which is inserted into an axial opening **51** in the other end of the rod **41.** The ball detent **49** engages with recesses **52** and **53** formed in the upper face of the operating lever **45.** The bolt assembly is accommodated in a housing **54** shown in FIG. 4B and provided with a horizontal slot **55** and a vertical slot **56.**

The bolt lock is pivoted between its locking and unlocking position by withdrawing the end of operating lever **45** from an opening **47** or **48,** moving the lever to the suitable end of the slot **55** and then pushing the lever inwardly to engage a suitable opening **47** or **48.** The bolt lock is thus locked in its position.

While the operating lever **45** moves through the horizontal slot **55** the bolt lock is in its "extended" position. In order to retract the bolt lock the operating lever is moved to the unlocked position at the left end of slot **55** as shown in FIG. 4B and then moved upwardly in vertical slot **56.** This vertical upward movement of the operating lever moves the entire bolt lock assembly **37** which in turn pulls the bolt lock **42** upwardly into a retracted position.

In order to retain the bolt lock assembly in its retracted position, a notch or recess is provided in the inner face of the housing to receive the end of the operating lever **45.** Thus, when the operating lever is moved, to its extended position in slot **55** of the housing the end of the operating lever will pass through opening **48** in the body **37.** Also, the end of the operating lever will emerge on the outer surface of the body **37** and be inserted into the notch in the housing so as to lockingly secure the entire bolt lock assembly in its retracted position.

The frame **30** illustrated in FIG. **4** can be constructed so as to be collapsible as illustrated in FIGS. **6** and **7.** In the frame **30,** a vertical support **60** is pivoted by a hinge pin **61** to corner fitting **62** and locked in this position by a lock pin **63** and a second lock pin **64** in the upper corner fitting **65.** The upper end of the vertical support **60** is further provided with a pin **66** which is slideable in a slot **67** formed in a horizontal frame member **68.**

In order to collapse the frame, lock pins **63** and **64** are removed and the vertical supports **60** pivoted about hinge pin **61** so that the pin **66** slides within the slot **67** as shown in FIG. **7.** In this position, aligned lock pin holes **69** are shown in the lower fitting. The lock pin **63** is inserted through both of these holes and a hole **70** in the lower end of the vertical support when the frame is in its locked position as shown in FIG. **6.**

Similarly, the upper corner fitting **65** is provided with lock pin holes **71** only one of which is shown.

This collapsible frame can also be provided with a horizontal coupler as described above within the lower frame member in the position **10'.** Similarly, vertical couplers may be mounted in the horizontal frame member so that the result is a collapsible cargo frame having both horizontal and vertical couplers.

In the modified horizontal coupler of FIG. **8** an electric motor **80** has a worm drive **81** on its output shaft and the worm drive is in mesh with the threaded portion **17** of the bolt lock assembly. The ratchet drive is thus eliminated and the electric motor is of the reversible type so that rotation of the worm drive in a suitable direction will cause axial movement of the threaded portion of the bolt lock assembly and thus extension or retraction of the bolt lock.

In FIG. **9,** the horizontal coupler of the present invention is extended or retracted by means of a hydraulic or pneumatic motor. In this modification, the threaded portion of the bolt lock assembly is omitted and the bolt lock assembly **16** is extended at **90** and is provided with a piston **91** at its outer end. This piston **91** moves within a cylinder **92** attached to the coupler housing **14.** The cylinder is provided with a pressure port **93** for the extended position and a pressure port **94** for the retracted position. These pressure ports are connected to suitable sources of hydraulic fluid for air under pressure controlled in a manner known in the art to extend or retract the piston.

The bolt lock rod **23'** is provided with a longitudinal key-way **95** which receives a spline or key **96** formed in the inner face of a bolt lock tube **97** which is rotatably positioned within the cylinder **92** and has one end projecting outwardly thereof and the bolt lock lever **98** attached to this end.

In operation, applying pressure through the port **93** will cause the piston **91** to move toward the left as shown in FIG. **9** and to extend the bolt lock. The bolt lock assembly tubular portion **90** will move axially with respect to the bolt lock tube **97** which will remain in position. When the bolt lock is in its extended position, pivoting of the bolt lock lever 90° will rotate the tube **97** and by means of the key **96** and key-way **95** also pivot the bolt lock rod **23'** and the bolt lock **25** attached thereto.

Thus it can be seen that the present invention has disclosed a freight container coupler which is simple in construction and effective in operation. When not in use, the coupler is retracted completely within the container and does not interfere in any way with the use of rigging devices with the corner fittings. In operation, the locking portion of the coupler can be extended beyond the outline of the container locking, engaged with a similar container and then partially retracted to draw the two containers in close relationship. By providing two such couplers on diagonally opposite corners of a face of a container, this container can be securely coupled to a similar container to form a unit load which can be readily handled during loading or unloading operations. Further, a number of smaller containers can be thus securely coupled together to form a unit load whose overall dimensions correspond to that of a larger standardized container. The arrangement of a plurality of horizontal and vertical couplers on a container will enable this container to be coupled to any other container.

It will be understood that this invention is susceptible to modification in order to adapt it to different usages

and conditions, and, accordingly, it is desired to comprehend such modifications within this invention as may fall within the scope of the appended claims.

What is claimed is:

1. A freight container coupler for coupling to an adjacent container comprising a housing adapted to be mounted in the corner of a freight container, a bolt lock assembly axially displaceable within said housing, a bolt lock on the end of said bolt lock assembly and pivotable between locking and unlocking positions, means on said housing for extending said bolt lock assembly with respect to said housing to project the bolt lock outwardly of the container so that the bolt lock is engageable in an opening in an adjacent container and for retracting said bolt lock assembly, means on said bolt lock assembly for pivoting said bolt lock between said locking and unlocking positions to lock an adjacent container, at least a portion of said bolt lock assembly projecting outwardly of said housing and the projecting portion being threaded, means drivingly engaging said threaded portion of the bolt lock assembly for extending and retracting said assembly, said bolt lock assembly having an axial bore therethrough, a bolt lock rod rotatably positioned within said bore, said bolt lock being on the end of the bolt lock rod within said housing, the other end of said bolt lock rod extending outwardly of the threaded portion of said bolt lock assembly and having a bolt lock lever thereon.

2. A freight container coupler as claimed in claim 1 wherein said bolt lock lever comprises telescoping members so as to be retractable within the outline of the container in which the coupler is mounted.

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