

Feb. 21, 1961

A. ABOLINS

2,972,175

HORIZONTAL CONTAINER COUPLER

Filed June 8, 1959

4 Sheets-Sheet 1

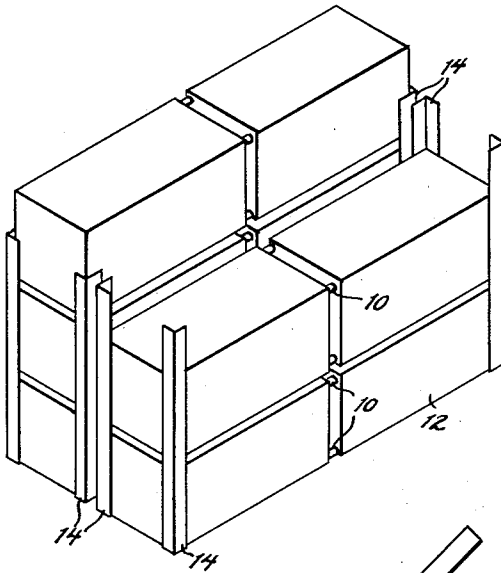


Fig. 1.

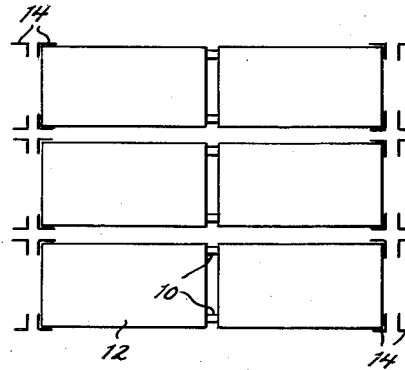


Fig. 2.

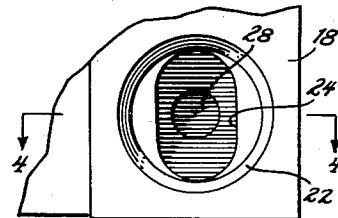


Fig. 3.

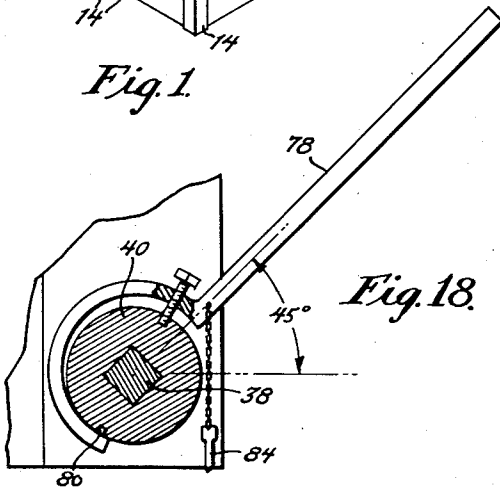


Fig. 18.

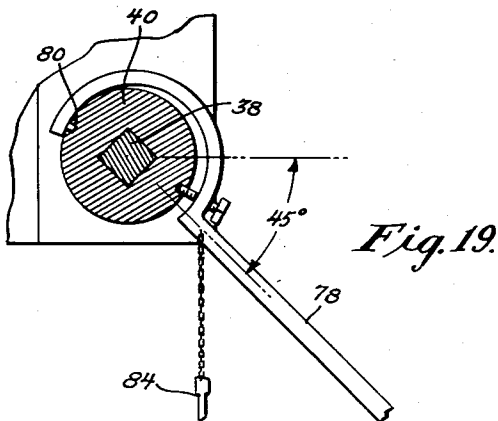


Fig. 19.

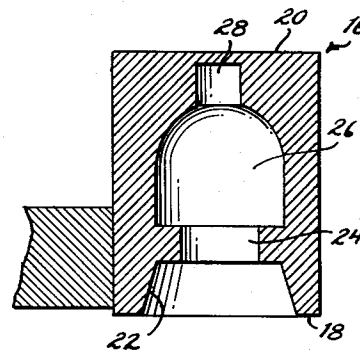


Fig. 4.

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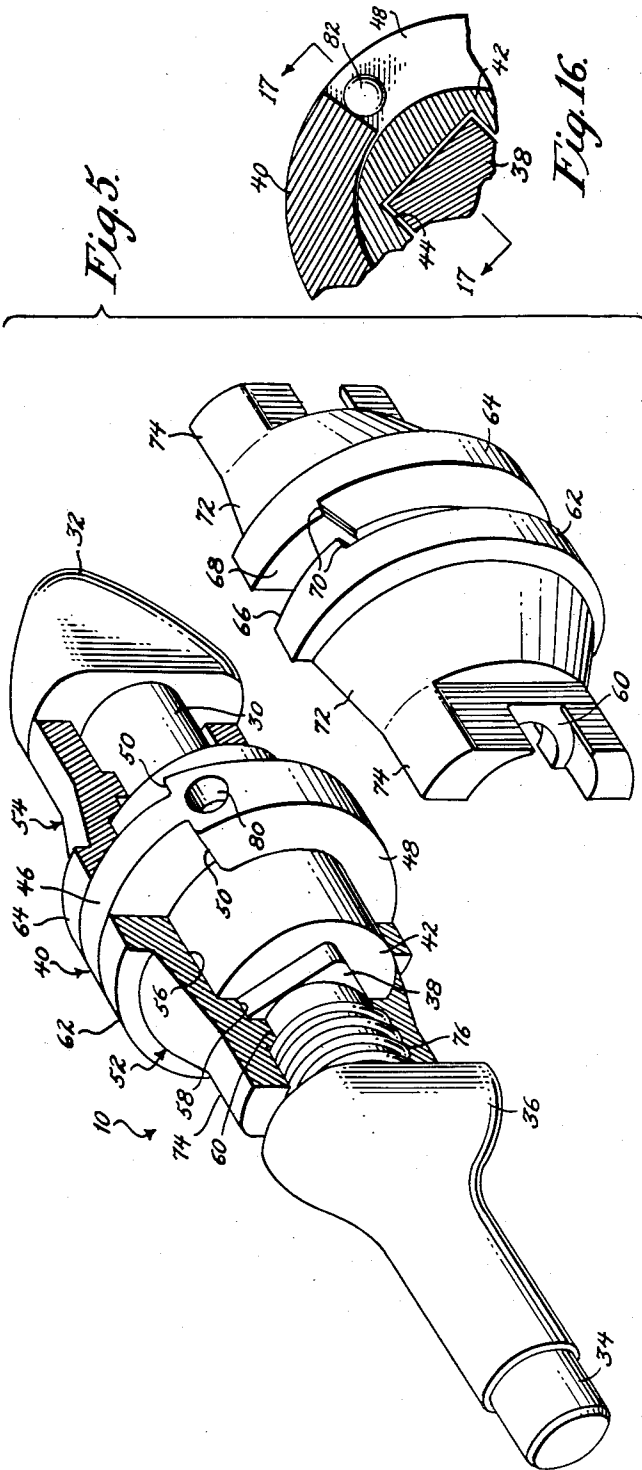
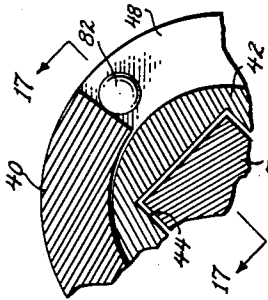
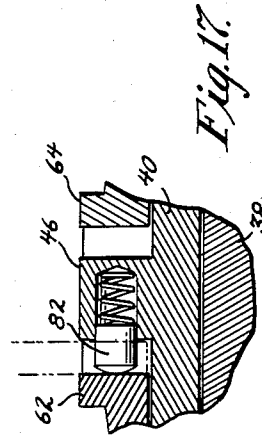
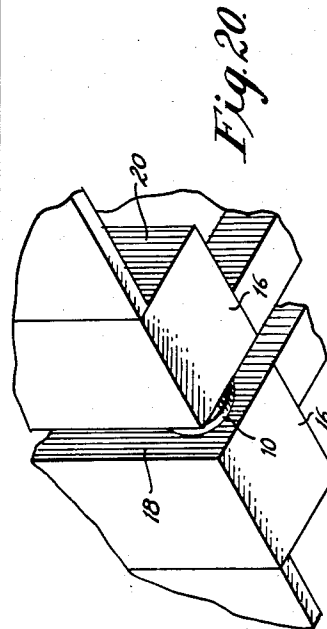
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4 Sheets-Sheet 2



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4 Sheets-Sheet 3

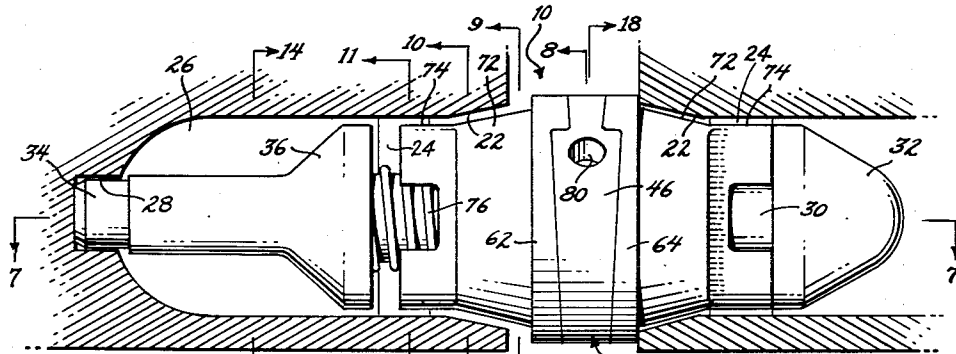


Fig. 6.

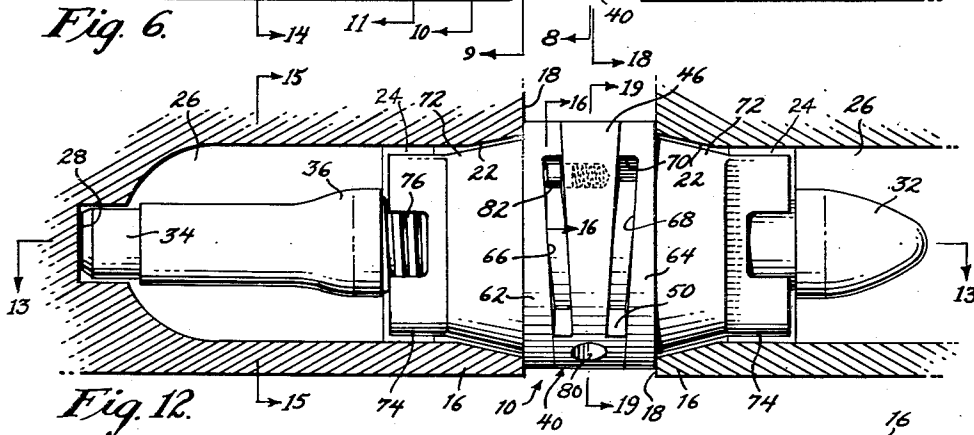


Fig. 12.

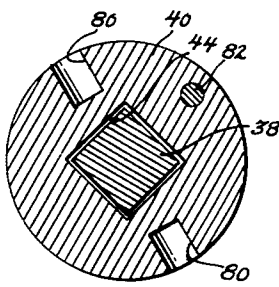


Fig. 8.

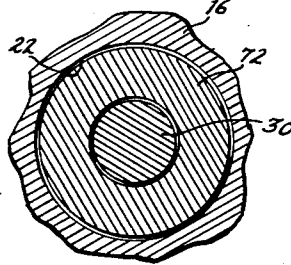


Fig. 10.

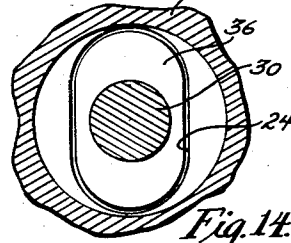


Fig. 14.

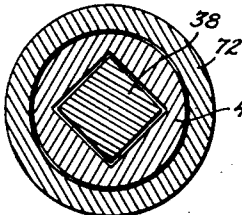


Fig. 9.

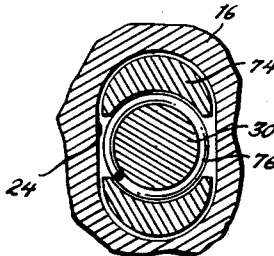


Fig. 11.

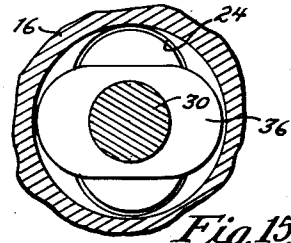


Fig. 15.

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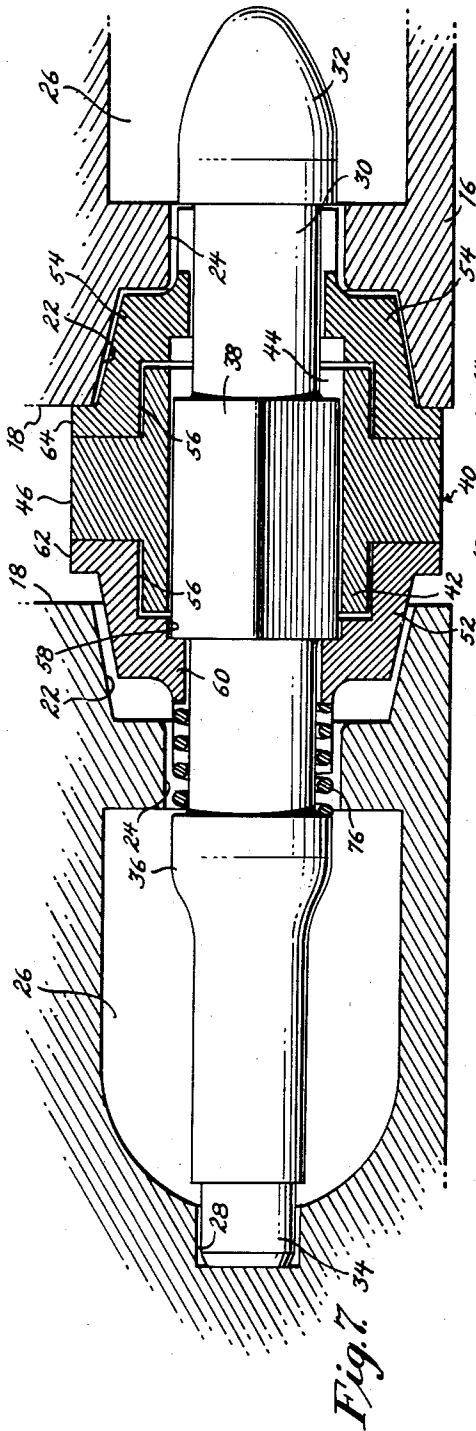
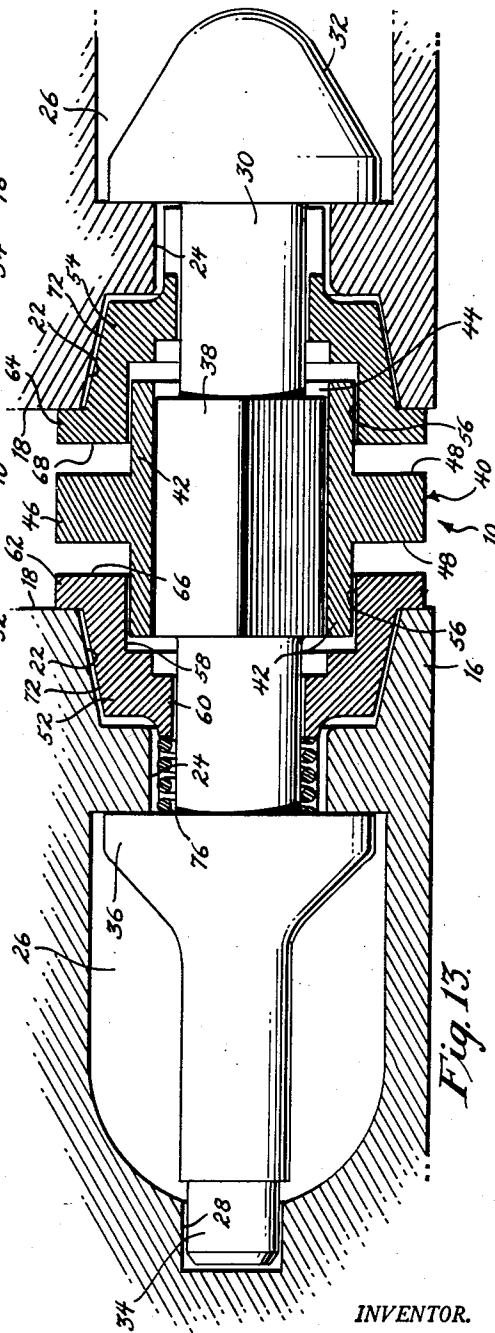
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4 Sheets-Sheet 4



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2,972,175

HORIZONTAL CONTAINER COUPLER

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Filed June 8, 1959, Ser. No. 818,805

14 Claims. (Cl. 24—221)

This invention relates to coupling mechanisms which are particularly adapted for use with containerized cargo, the modern trend in freight haulage.

An advanced form of containerized cargo is the method of hauling freight by ship, rail or air, wherein the shipping container itself is a trailer body demountable from its running gear, the same when laden with cargo attaining a gross weight in the many thousands of pounds. It is economically advantageous frequently to couple two trailer bodies, such as 17 foot bodies and lift the coupled bodies as a unit into the hold of or onto the deck of a ship, onto a railroad flat car or onto a flat bed trailer. It is manifest that, since the coupled bodies when laden with cargo are very heavy, tensional and shear forces are transmitted to the means coupling the bodies not only during the lifting operation but also during the transportation thereof, as when the ship pitches, or the vehicle transporting the containers rides on slopes or suddenly starts and stops.

The primary object of the invention is to provide means for horizontally coupling containers which are capable of transmitting great tensional and shearing forces and which at the same time occupy only a minimum of space.

Another object of the invention is to provide horizontal couplers for containers which are easy to mount upon the containers and which are automatically snapped into positive coupling positions in response to a predetermined movement of one container relative to the other.

Another object of the invention is to provide a horizontal container coupler which while compact and strong is nevertheless relatively simple to manufacture and operate.

These and other objects of the invention will become more apparent as the following description proceeds in conjunction with the accompanying drawings, wherein:

Figure 1 is a diagrammatic perspective view of coupled containers stored in the hold of a ship;

Figure 2 is a diagrammatic plan view of coupled containers stored in the hold of a ship;

Figure 3 is an end elevational view of a corner member associated with a container;

Figure 4 is a sectional view taken on the line 4—4 of Figure 3;

Figure 5 is a perspective view, partly broken away, of a complete coupler;

Figure 6 is a side elevational view of the coupler in ready to engage condition, the corner members being shown in section;

Figure 7 is a sectional view taken on the line 7—7 of Figure 6;

Figure 8 is a sectional view taken on the line 8—8 of Figure 6;

Figure 9 is a sectional view taken on the line 9—9 of Figure 6;

Figure 10 is a sectional view taken on the line 10—10 of Figure 6;

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Figure 11 is a sectional view taken on the line 11—11 of Figure 6;

Figure 12 is a side elevational view of the coupler in the coupled condition, the corner members being shown in section;

Figure 13 is a sectional view taken on the line 13—13 of Figure 12;

Figure 14 is a sectional view taken on the line 14—14 of Figure 6;

Figure 15 is a sectional view taken on the line 15—15 of Figure 12;

Figure 16 is a sectional view taken on the line 16—16 of Figure 12 showing the locking detent in operation;

Figure 17 is a sectional view taken on the line 17—17 of Figure 16;

Figure 18 is a sectional view taken on the line 18—18 of Figure 6, partly diagrammatic, and showing the spanner tool in position;

Figure 19 is a sectional view taken on the line 19—19 of Figure 12; partly diagrammatic, and showing the spanner tool in position; and

Figure 20 is a fragmentary perspective view from below the corners of the coupled containers.

Specific reference is now made to the drawings wherein similar reference characters are used for corresponding elements throughout.

The present horizontal coupler 10 is used to couple the corners of containers, such as frameless trailer bodies 12. As will appear hereinafter, the couplers are capable of transmitting tension, compression and shear forces from container to container to produce a unitary structure, so that the connected containers may be supported or lifted by auxiliary devices (not shown) which do not contribute to the strength of the connected containers. The coupled containers, which are preferably van size cargo bodies, are lifted as a unit, from the ground, a supporting structure at a freight depot, trailer running gear or a flat bed trailer and placed into the hold of a ship equipped with vertical spacer beams 14 or on ship deck or on a railroad flat car. As shown more particularly in Figures 3, 4 and 20, each container includes a corner member 16, which could be a casting, operatively connected to the side and end walls of the container, including opposed vertical wall surfaces 18 and 20. Opening through one of the wall surfaces 18 is a tapered recess 22 which communicates with an elongated slot 24 that in turn communicates with a further enlarged generally rounded recess 26 which terminates in a reduced socket 28.

Coming now to the coupler itself, the same includes a rod 30 one end of which carries an enlarged tapered head 32, the other end of which has a reduced portion 34 adapted to enter the socket 28 in one of the corner members. Adjacent said reduced portion the rod also includes another enlarged tapered head 36 of generally the same shape and dimensions as the first head 32. The maximum length of each head is somewhat less than the length of the slot 24 in the corner member but greater than the width thereof. Intermediate its ends the rod 30 includes an enlarged squared member 38.

A spreader member 40 is provided, the same including a cylindrical portion 42 having a square through bore 44 receiving the square portion 38 of the rod 30. Hence, the spreader member is movable longitudinally of the rod 30 but is rotatable with said rod. The cylindrical portion 42 includes a central radially extending flange 46 whose opposed sides 48 are tapered cam surfaces. At a particular position the flange 46 includes lateral shoulders 50, the cam surfaces 48 tapering gradually inwardly from said shoulders and at a position diametrically opposite said shoulders 50, the flange 46 includes a second pair of similar shoulders (not shown)

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and the remaining portions of the cam surfaces 48 again taper inwardly from the second pair of shoulders to the first pair 50.

A pair of conical members 52 and 54, preferably identical, are provided, each having a through bore of stepped construction. One portion 56 of the bore rotatably receives the cylindrical portion 42 of the spreader member. An adjacent bore portion 58, of predetermined short length, normally receives a short section of the square member 38 of the rod 30. Adjacent the bore portion 58, the conical member includes an inwardly extending shoulder 60 which bears rotatably on the rod 30 in advance of the square member 38.

The conical members 52 and 54 include radially extending flanges 62 and 64 whose inner opposed faces 66 and 68 mate with the cam surfaces 48 of the spreader member 40. Thus the flanges 62 and 64 of the conical members include lateral shoulders 70 which are adapted to engage the shoulders 50 of the spreader member and the inner opposed faces 66 and 68 of the conical members have the same degree of inclination as but are tapered oppositely to that of the cam surfaces 48. A portion 72 of each conical member is tapered to conform with the tapered recess 22 of the container corner member 16 and a portion 74 of the conical member is substantially coextensive with the coupler heads 32 and 36. A spring 76 is wound about the rod 30 next to the head 36 and bears against the shoulder 60 of the conical member 52, the spring normally urging the conical members and spreader towards the opposite head 32 as shown in Figures 5, 6 and 7.

In use, with the parts assembled as shown in Figure 5 and the heads 32 and 36 aligned with the slots 24 of opposed corner members 16, the coupler is inserted in the corner member of one of the containers with the reduced portion 34 engaged in the socket 28 and the head 36 and conical member 52 disposed in the corner member as shown in Figure 6. The coupler is thus retained in a horizontal position. The other container is then moved towards the first container until the head 32 and conical member 54 are disposed in the opposed corner member of the second container, as shown in Figure 6. A spanner wrench 78 is made to engage the spreader member through diametrically opposed sockets 80. The weight of the spanner wrench tends to rotate the spreader and the rod 30 but is restrained from doing so because the bore portion 58 of the conical member 52 engages a portion of the square member 42 of the rod and the conical member 52 is itself restrained from rotating by virtue of the engagement of its longitudinal portion 74 in the slot 24 of the corner member.

Continued movement of the second container relative to the first causes the free edge of the corner member of said container to press against the flange 64 of the conical member 54 whereupon the conical member 54, the spreader 40 and the other conical member 52 move towards the head 36 against action of the spring 76. This occurs until the bore portion 58 of the conical member 52 is disengaged from the square member 42, as shown in Figure 13, at which point the spreader 40 and rod 30 are free to rotate as a unit relative to the conical members. Accordingly, at this point the weight of the spanner wrench induces the rod 30 to rotate so that the heads 32 and 36 thereof traverse the slots 24 in the corner members to effect partial coupling. When this occurs, the spreader 40 urges the conical members axially apart. Continued manual rotation of the spanner wrench completes the coupling action wherein the heads 32 and 36 are perpendicular to the longitudinal axes of the corner slots 24, as shown in Figure 15, at which point the spreader urges the conical members to their maximum extended positions with the tapered portions 72 thereof engaging the tapered recesses 22 of the corner members thereby rigidly coupling the containers. To releasably retain the containers in a locked coupled posi-

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tion, the flange 46 of the spreader is provided with a spring-urged detent 82, see Figure 17, which presses against the inner surface of one of the flanges 62 or 64 of the conical members.

Uncoupling of the containers can be effected by reversing the above procedure, as will be evident to skilled artisans, it being understood that a suitable tool 84 can be used to urge the detent 82 out of engagement with the flange 62 or 64 just prior to reverse rotation of the spanner wrench.

Thus it will be seen that a horizontal container coupler is provided which not only couples the containers automatically and rigidly, but which is also capable of transmitting very large tension, compression and vertical shear forces from container to container so that the connected containers as a unitary structure can be lifted or supported by means which do not contribute to the strength of the connected containers. It will be understood that skilled artisans may make minor changes in the construction, shape and assembly of parts without departing from the spirit of the invention and the scope of the appended claims.

I claim:

1. A device for coupling two members each provided with a non-circular slot comprising a rod having spaced non-circular heads adapted to extend through said slots when aligned therewith, a unit rotatably mounted on said rod between said heads and movable axially of said rod, resilient means operative on said unit urging it towards one of said heads when said heads are aligned in said slots in the uncoupled position, and means operative at said uncoupled position restraining relative rotation of said unit and said rod but inoperative when said unit is moved against action of said resilient means a predetermined distance towards the other of said heads whereby a force may then be applied to rotate said heads in unison to coupling positions wherein said heads are disaligned with said slots.

2. A device for coupling two members horizontally comprising a vertical wall in each member having an elongated slot therethrough, a rod having spaced enlarged heads adapted to extend through said slots when aligned therewith, each head having a length shorter than the slot but greater than the width thereof, a unit rotatably mounted on said rod between said heads and movable axially of said rod, spring means operative between one of said heads and said unit urging the latter towards said other head when said heads are aligned in the slots of said members in the uncoupled position, and means operative at said uncoupled position restraining relative rotation of said unit and said rod but inoperative when said unit is moved against action of said spring means a predetermined distance towards said one head whereby a force may then be applied to rotate said heads in unison to coupling positions wherein said heads traverse said slots.

3. The combination of claim 2 wherein said unit comprises a pair of sections, and means mounted on said rod to rotate therewith but movable axially thereof acting upon said sections to spread them apart when a force is applied to rotate said heads in unison to coupling positions.

4. The combination of claim 2 wherein one of said members includes a recess beyond said slot, said rod including a portion extending beyond said one head and engaged in said recess whereby the coupler is retained in a horizontal position during the coupling operation.

5. A coupler comprising a rod having an enlarged head, a member mounted on said rod for rotation therewith but slidable axially thereof, a collar rotatably mounted on said member having a portion rotatably receiving said rod on one side of said member, means restraining rotation of said collar, resilient means urging said collar and member away from said head when said head is in a ready-to-couple position adapted for insertion through the slot of a unit, and means effecting non-

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rotatable engagement of said collar with said rod in said ready-to-couple position which becomes inoperative when said collar and member are moved a predetermined distance against action of said resilient means towards said head whereby a force may then be applied to said member to rotate the latter and said head into a coupling position other than that of said first-named ready-to-couple position.

6. A coupler comprising a rod having a pair of spaced enlarged coupler heads, a member mounted on said rod between said heads for rotation therewith but slidable axially thereof, a collar rotatably mounted on said member having a portion rotatably receiving said rod on one side of said member, means restraining rotation of said collar, resilient means acting between one of said heads and said collar urging said collar and member towards the other head when said heads are in a ready-to-couple position for insertion through slots of units adapted to receive said heads, and means effecting non-rotatable engagement of said collar with said rod in said ready-to-couple position which becomes inoperative when said collar and member are moved a predetermined distance against action of said resilient means towards said one head whereby a force may then be applied to said member to rotate the latter and said heads into a coupling position other than that of said first-named ready-to-couple position.

7. A unit for coupling two members each having an elongated slot therethrough, a rod having spaced enlarged heads adapted to extend through said slots when aligned therewith, each head having a length shorter than the slot but greater than the width thereof, a generally cylindrical member mounted on said rod for rotation therewith but slidable axially thereof, a pair of collars rotatably mounted on said cylindrical member and having portions rotatably receiving said rod on opposite sides of said cylindrical member, means restraining rotation of said collars, a spring operative between one of said heads and one of said collars urging said collars and said cylindrical member towards the other head when the heads are aligned in the slots in the uncoupled position, and means effecting non-rotatable engagement of one of said collars with said rod in said uncoupled position which becomes inoperative when said collars and cylindrical member are moved a predetermined distance against action of said spring towards said one head whereby a force may then be applied to said cylindrical member to rotate the latter and said heads into coupling positions transverse of said slots.

8. The combination of claim 7 and cam means operative between said cylindrical member and said collars acting to spread said collars apart when a force is applied to said cylindrical member to rotate the same and said rod wherein the heads are turned to coupling positions transverse said slots.

9. The combination of claim 7 wherein said means restraining rotation of said collars includes end portions of said collars approximating the length of said slots and engaged therein.

10. A coupler for two units each having a wall and an elongated slot therethrough, a rod having spaced enlarged heads adapted to extend through said slots when aligned therewith, said rod including a non-circular portion intermediate said heads, a member having a through

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bore corresponding to and receiving said non-circular portion for rotation with said rod but axially slidable thereon, a pair of collars each having a circular through bore receiving said member and a portion of said rod, resilient means operative between one of said heads and one of said collars urging said collars and member towards the other head when said heads are aligned with said slots in the uncoupled position, a portion of said circular bore of said one collar engaging a part of said non-circular portion of said rod in said uncoupled position, and end portions of said collars being non-rotatably received in said slots, whereby when said collars and member are moved towards said one head until said portion of said circular bore of said one collar is free of said non-circular portion of said rod, a force applied to said member will rotate the same, the rod and the heads to a coupling position wherein said heads traverse said slots.

11. The combination of claim 10 wherein said rod extends beyond said one head and one of said units includes an enlarged recess behind said slot receiving said one head and rod extension and a socket behind said recess receiving the end of said rod extension whereby the coupler is self-sustained in a horizontal position during the coupling operation.

12. The combination of claim 10 wherein said member includes a flange with tapered side faces and said collars include opposed side faces corresponding to but tapered oppositely to an adjacent side face of said flange whereby when a force is applied to said member to rotate the same, a camming action occurs between the side faces of said flange and the side faces of said collars urging said collars apart and into engagement with the walls of said units.

13. The combination of claim 12 and a releasable means to lock said member and said collars together when said collars are spread apart and said heads are in the coupled position.

14. A coupler comprising a rod having a pair of spaced enlarged coupler heads, a member mounted on said rod between said heads for rotation therewith but slidable axially thereof, a pair of collars rotatably mounted on said member each having a portion rotatably receiving said rod, means restraining rotation of said collars, resilient means operative between one of said heads and one of said collars urging said collars and member towards the other head when said heads are in a ready-to-couple position for insertion through slots of units adapted to receive said heads, a weighted object attached to said member and means effecting non-rotatable engagement of one of said collars with said rod in said ready-to-couple position which becomes inoperative when said collars and member are moved a predetermined distance against action of said resilient means towards said one head whereby said weighted object then causes said member and heads to rotate into a coupling position in which said heads transverse said first-named ready-to-couple position.

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