

Dec. 6, 1960

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2,963,310

VERTICAL CONTAINER COUPLERS

Filed Jan. 20, 1959

4 Sheets-Sheet 1

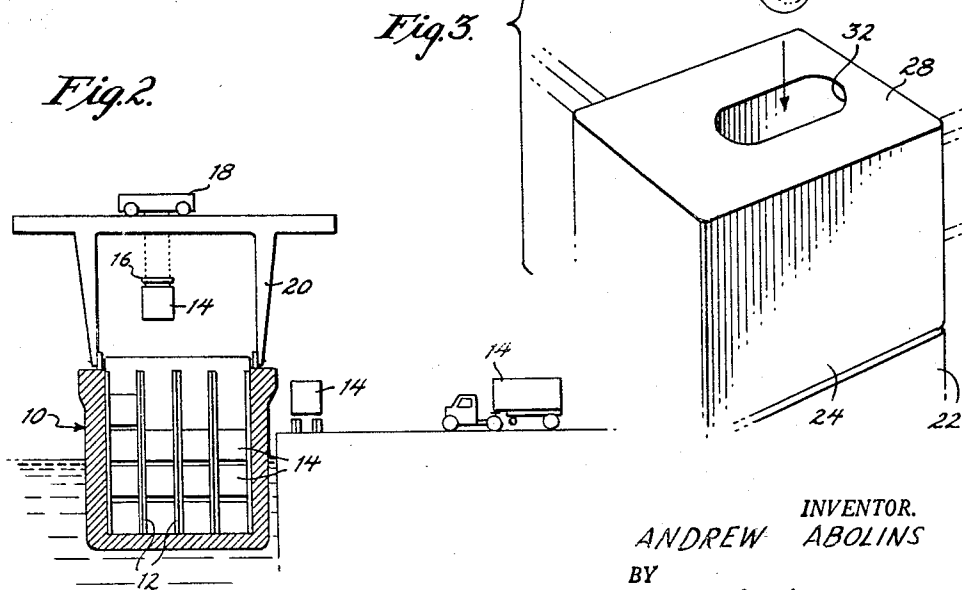
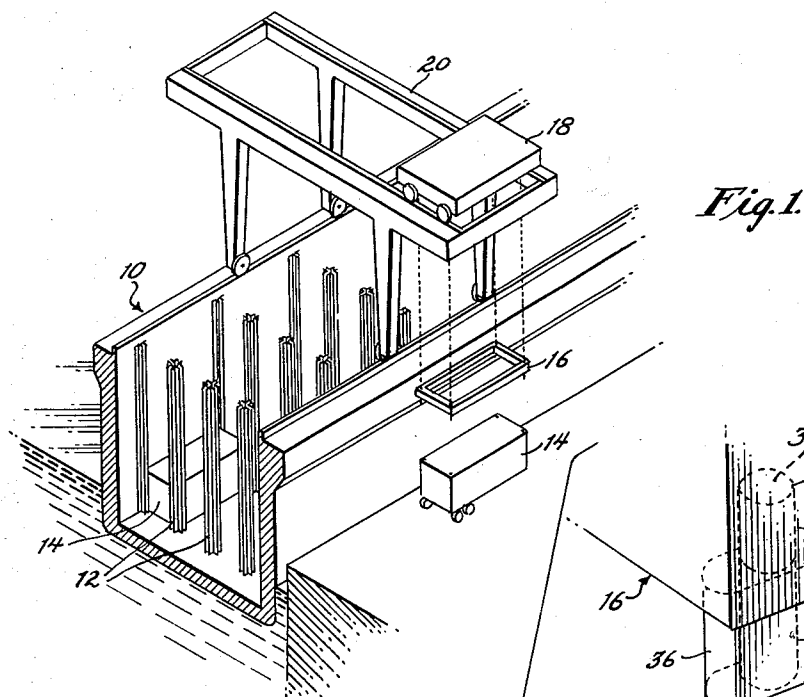
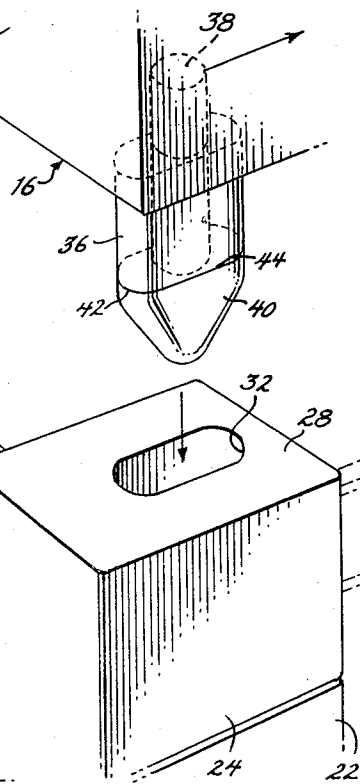


Fig. 3.



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4 Sheets-Sheet 2

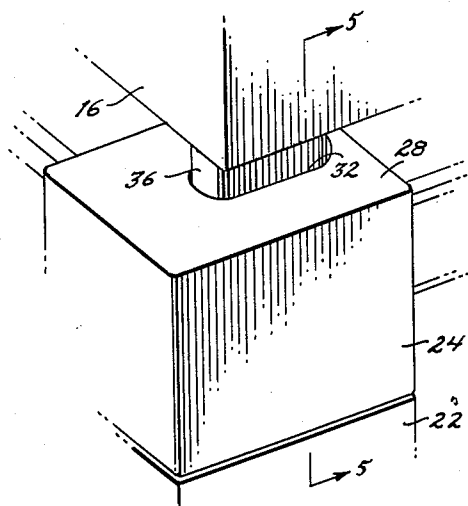


Fig. 4.

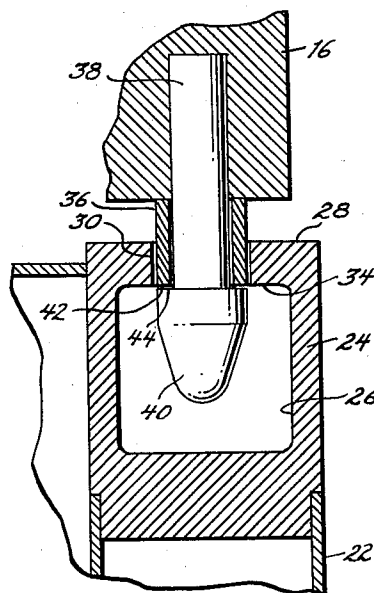


Fig. 5.

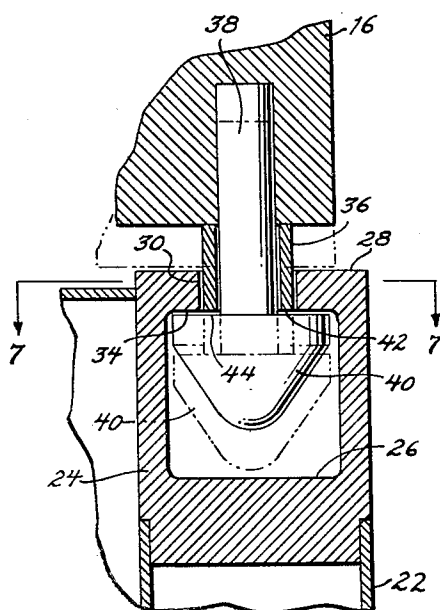


Fig. 6.

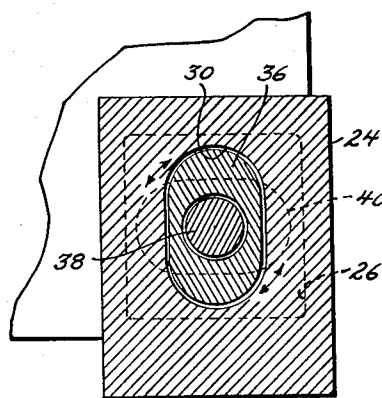


Fig. 7.

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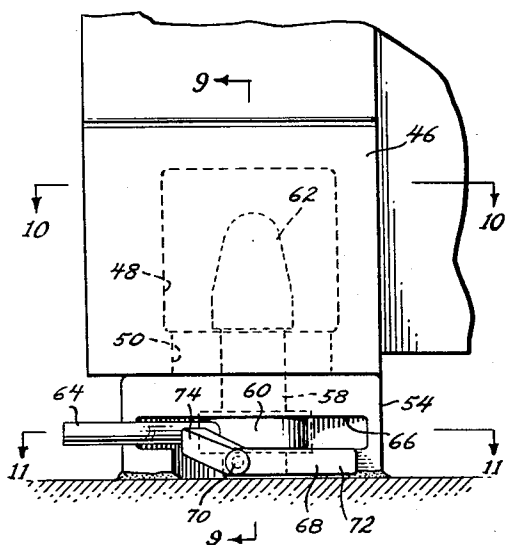


Fig. 8.

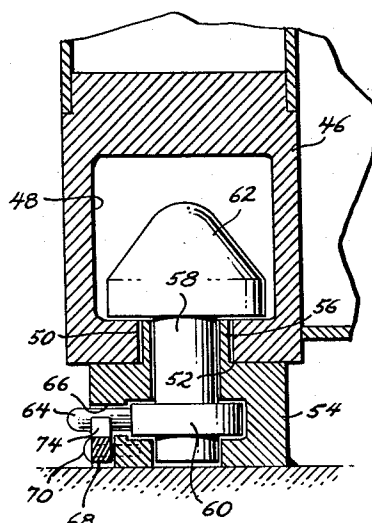


Fig.9.

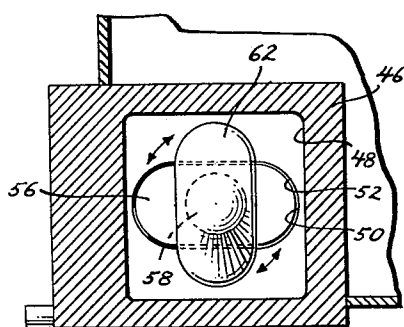


Fig. 10.

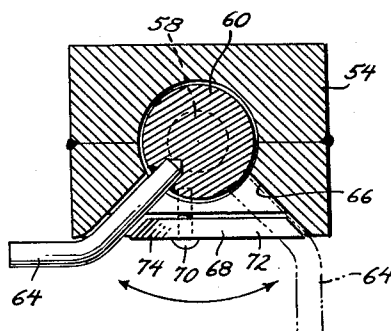


Fig. 11.

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4 Sheets-Sheet 4

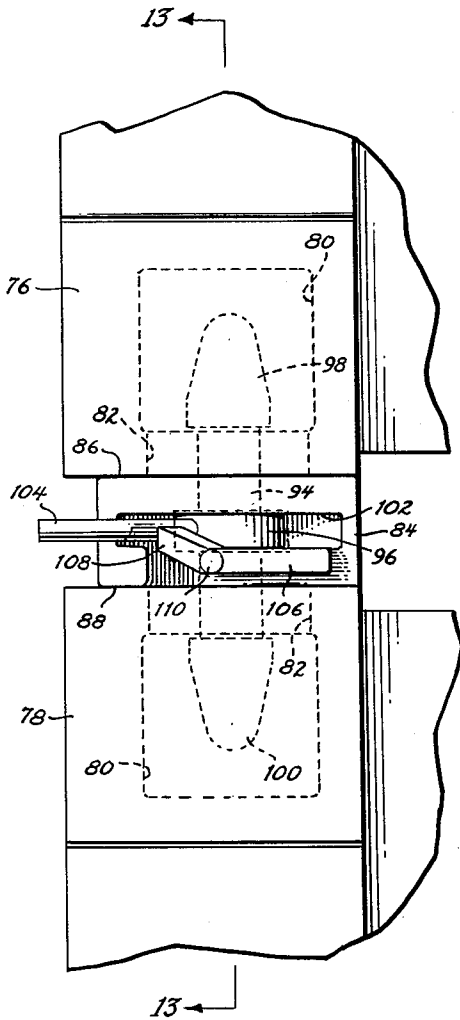


Fig. 12.

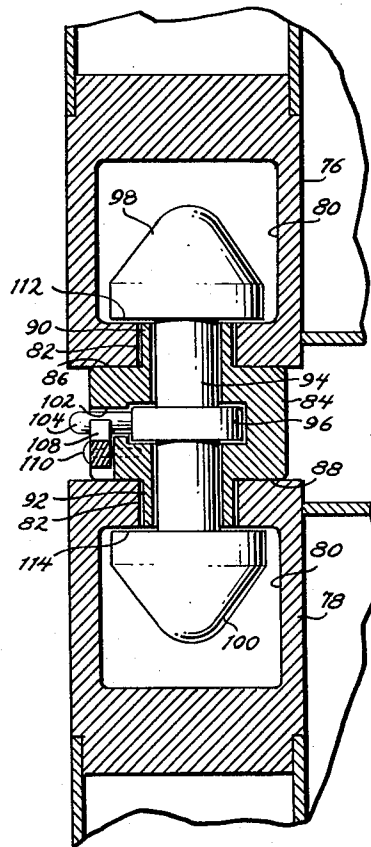


Fig. 13.

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2,963,310

VERTICAL CONTAINER COUPLERS

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11 Claims. (Cl. 294—67)

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, the same when laden with cargo attaining a gross weight in the many thousands of pounds. A crane or lifting mechanism can be used to lower the cargo-laden container into the hull of a ship, onto a railroad flat car or onto a flat bed trailer, in which case the lifting mechanism is removably coupled to the container. If one or more of the coupling pins carried by the lifting mechanism become misaligned in the container slots receiving them, not only is it difficult efficiently to remove the pins but also, because of the large weight of the containerized cargo, the container and/or the lifting mechanism may be injured and the pins torn.

A primary object of the invention is to provide a means coupling a lifting mechanism to a container, whereby uncoupling may be readily accomplished with little or no possibility of damage to lifting mechanism, container or coupling pins, irrespective of the weight of the container.

In the containerized cargo method of freight haulage, the container laden with the cargo is removably coupled upon the deck of a ship or the flat bed of a railroad car or other vehicle. In the case of a ship, pitching thereof will tend to transmit forces to the coupling pins sufficient to shear them. In the case of a railroad car or other vehicle, movement of the same on slopes or sudden starting and stopping of the same will also tend to transmit forces to the coupling pins sufficient to shear them.

It is another important object of the invention to provide a means to vertically couple containerized cargo to a flat-bedded vehicle wherein the shearing effect of the motion of the vehicle upon the coupling pins is minimized or eliminated and the uncoupling action can be readily and easily accomplished.

In some cases cargo-laden containers are stacked vertically and must be removably coupled. It is another object of the invention to provide a means for vertically coupling a container to a container wherein the coupling and uncoupling operations can be easily accomplished and the possible effect of shearing forces on the coupling pins is minimized or eliminated.

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 a crane in position to lift a cargo-laden container and place the same in the hull of a ship;

Figure 2 is a diagrammatic elevational view thereof illustrating the lowering of the container into the hull;

Figure 3 is a group perspective view of the means to couple the lifting frame to the container;

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Figure 4 is a view similar to Figure 3 showing the coupling pin engaged in a corner of the container but not locked therein;

Figure 5 is a sectional view taken on the line 5—5 of Figure 4;

Figure 6 is a view similar to Figure 5 showing the locked position of the coupling pin;

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

Figure 8 is a fragmentary side elevational view of another form of the invention, namely a means vertically coupling a container to a flat member, such as a ship's deck;

Figure 9 is a sectional view taken on the line 9—9 of Figure 8;

Figure 10 is a sectional view taken on the line 10—10 of Figure 8;

Figure 11 is a sectional view taken on the line 11—11 of Figure 8;

Figure 12 is a fragmentary side elevational view of another form of the invention, namely a means vertically coupling a container to a container; and

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

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

Attention is first called to Figures 1—7. While Figures 1 and 2 illustrate the loading of the hull of a ship, it will be understood that the principles of the invention are applicable to the loading of containerized cargo on any vehicle. The hull of a ship 10 is conventionally provided with a plurality of vertical spacer beams 12 in the hold thereof which provide compartments for the receipt of vertically stacked cargo-laden containers 14. As shown diagrammatically, the container may be a trailer body which is lifted by a frame 16 that is vertically operable from a carriage 18 movably mounted on a suitable structure 20 engaging the ship deck over the hold. Any suitable lifting mechanism may be employed for the invention appertains to the means for coupling the lifting frame to the container.

The container 14 which is preferably rectangular generally comprises top, bottom, side and end walls retained in assembled position by corner posts 22 upon each upper end of which is fitted a casting 24. The casting includes a substantially rectangular recess 26 which opens through the upper face 28 of the corner casting via a reduced neck portion 30 which terminates in a generally rectangular opening 32 that is coextensive with the neck portion. The neck portion 30 being reduced forms with the recess 26 a continuous shoulder portion 34. The opening 32 forms an entrance slot and the configuration thereof is such that it is simply longer than it is wide.

Fixed to and depending from the frame 16 adjacent each of its corners is an elongated filler member 36 which is shaped like that of the opening 32 and neck portion 30 and which is adapted to enter the opening and fit into the neck portion with some clearance.

Extending rotatably and vertically through the member 36 and the frame 16 is a rod 38 which is adapted to be operatively connected to a rotating means (not shown). Fixed to the lower end of the rod and disposed exteriorly of the member 36 is a smoothly and downwardly tapered head 40. The lower face 42 of the filler member 36 is spaced above the upper face 44 of the head by slight clearance. As shown clearly in Figure 3, the maximum horizontal cross-section of the head 40 is the same as the horizontal cross-section of the filler member 36. Also, the maximum length of the

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head 40 is less than the length of the entrance slot 32 and neck portion 30 but exceeds their width.

In operation, with the head 40 in the position shown in Figure 3 relative to the slot 32 where the longitudinal axis of the head is generally in alignment with the longitudinal axis of the slot, the frame 16 is lowered and the head 40 and filler member 36 enter each corner casting 24, being guided therein by the tapering of the head 40. When the frame rests upon the castings, the head 40 is disposed in the recess 26 and the filler member 36 is disposed in the neck portion 30. The rod 38 is then rotated 90° into the coupling position whereby the head 40 traverses the width or shorter dimension of the neck portion. The frame is then lifted, the container being coupled thereto by virtue of the upper face 44 of the head being in engagement with the shoulder 34 of the recess 26.

When the container is lowered into the hold of a ship or onto a flat-bedded vehicle, it becomes necessary to uncouple the frame from the container by rotating the rod 38 another 90°. Frequently, at this point one of the coupling pins is misaligned. If a conventional T-coupling pin is employed, the head hangs up against an extreme portion of the entrance slot making removal difficult and often impossible until alignment is re-established. An effort forcibly to remove the conventional T-coupling pin can distort the frame, the container corner casting or the pin itself and may even tear the latter. In the present construction this is not possible, for when the pin or rod 38 is rotated so that the head 40 assumes the position shown in Figure 3 relative to the filler member 36, the fact that the maximum horizontal cross-section of the head is the same as the horizontal cross-section of the filler member renders it impossible for any portion of the head, in the uncoupling position, from engaging any portion of the shoulder 34 of the recess 26. Removal is therefore positive and smooth and any horizontal shearing forces which may develop are transmitted to the filler member 36 and not to the rod or pin 38, which is of lesser diameter and therefore weaker.

A further application of this principle is shown in Figures 8-11 which illustrates a means to positively couple a container to the ground or a flat-bedded vehicle or on the deck of a ship. In this instance the lower corner castings 46 are substantially the same as the upper corner castings 24 previously described. The casting 46 therefore includes a recess 48 having a reduced neck portion 50 which terminates in an entrance slot 52 that is coextensive with the neck portion 50.

The coupler 54 is a casting or block, preferably split, which is welded or otherwise fixed to the deck, flat bed or equivalent support and which includes a reduced filler portion 56 adapted to enter the neck portion 50. Rotatably mounted in the casting or block is a pin or rod 58 to which is fixed, intermediate its ends, a thrust collar 60 of diameter in excess of that of the pin.

At the upper end of the pin 58 is fixed a smoothly tapered head 62 whose maximum horizontal cross-section is the same as the horizontal cross-section of the filler member 56. As in the case of the previously described head 40, the length of the head 62 is less than the length of the neck portion 50 and slot 52 but greater than the width of said neck portion and slot.

The means to rotate the pin and head comprises an angulated, relatively short handle 64 fixed to the thrust collar 60 and extending through a recessed slot 66 which opens through one face of the casting or block 54. A gravity-actuated keeper 68 is provided which is in the form of an angulated bar that is pivoted at its corner on a horizontal pivot pin 70 carried by the casting or block. By virtue of the fact that slot 66 is recessed, the face of the keeper bar 68 is substantially flush with the face of the casting. Since one arm 72 of the keeper bar is longer than the other arm 74, when the handle

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64 is moved from right to left or from the uncoupled to the coupled position, the handle ultimately strikes and depresses the arm 74 which then reassumes its original position, as shown in Figure 8, after the handle clears the arm 74. To move the handle from left to right, or from the coupled to the uncoupled position, the arm 74 is first manually depressed and then the handle is rotated.

In operation, the container is lowered onto the coupling members when the heads 62 are in substantial alignment with the entrance slots 52 of the corner castings. With the container resting on the castings or blocks 54, each handle 64 is rotated from right to left in the drawings until the free edge of the arm 74 of the locking bar 68 engages the handle, in which position the head 62 traverses the width of the neck portion 50 inside the corner casting recess 48 as shown clearly in Figures 9 and 10. It will be seen that the horizontal shearing forces due to the rolling or pitching of the ship or motion of the flat-bedded vehicle will be taken up by the filler portion 56 and not the coupling pin 58. The thrust collar 60 takes up the vertical forces. When the time comes to uncouple the container, the handle 64 is rotated from left to right in the drawings after manual depression of the arm 74 of the locking bar. By virtue of the filler member 56 and the fact that its horizontal cross-section is the same as the maximum horizontal cross-section of the head 62, the head cannot hang up in the corner casting. Hence, the coupling pin is always freely rotatable and the container may be readily and easily lifted from the couplers irrespective of the weight of the container or the fact that one of the coupling pins may have become misaligned in a corner casting.

The device shown in Figures 12 and 13 is an extension of that shown in Figures 8-11. Here vertically stacked containers are being coupled. The corner castings 76 and 78 of the respective containers are alike and substantially the same as the corner castings of the previously described modifications. Each comprises a recess 80 having a reduced neck portion 82 which terminates in an entrance slot that is coextensive therewith.

The coupler comprises a casting or body 84 having opposed upper and lower faces 86 and 88 from which extend filler members 90 and 92 that are adapted to enter the neck portions 82 of the corner castings. Rotatably mounted in the body 84 is a rod or pin 94 to which is fixed, intermediate its ends, a thrust collar 96 of diameter greater than that of the pin. Fixed to the ends of the pin 94 are smoothly tapered heads 98 and 100, each of whose length is less than the length of the neck portion 82 but greater than the width of said neck portion. The maximum horizontal cross-section of each head is equal to the horizontal cross-section of the corresponding filler member so that when the heads are aligned with the filler members in the position for entry into the neck portions, there is a smooth, substantially unbroken outer surface at the juncture of each head and each corresponding filler member in the same manner as shown in Figure 3.

A recessed slot 102 is provided in the body 84 which opens through one face thereof, there being an angulated, relatively short handle 104 which is attached to the thrust collar 96 and which extends through the slot. A gravity-actuated keeper in the form of an angulated bar having a longer arm 106 and a shorter arm 108 is provided which at its corner is pivoted on a horizontal pivot pin 110 carried by the body 84.

In operation, with the handles 104 over the right of the drawings in the uncoupled position, the couplers are positioned on the upper faces of the corner castings of a container, the lower heads 100 entering the corner casting recesses 80 and the lower filler members 92 entering the neck portions 82. The next container is then lowered so that the recesses 80 of its lower corner castings receive

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the upper heads 98 of the couplers and upper filler members 90 enter the neck portions of said container. Rotation of the handle 104 from right to left in the drawings will turn the heads 98 and 100 in unison until their planar faces 112 and 114 traverse the width of the neck portions inside the corner recesses 80. The action of the keeper bar herein is the same as that previously described with respect to Figures 8-11. As mentioned earlier, the filler members 90 take up the horizontal shearing forces developed during the motion of the vehicle upon which the stacked containers are mounted. Because the horizontal cross-section of the filler members and the maximum horizontal cross-section of the heads are the same, pinching of the heads in the corner castings cannot occur so that the coupling pins are always free to rotate and the containers can be readily removed one from the other, notwithstanding the development of forces which would tend to misalign the coupling pins in the corner castings.

While preferred embodiments of the invention have here been shown and described, skilled artisans may make minor variations without departing from the spirit of the invention and the scope of the appended claims.

I claim:

1. Means for coupling two members vertically comprising a wall in one of said members having an elongated slot therethrough, a vertically extending coupling pin rotatably mounted on the other member and carrying a cross-head adapted to enter said slot when aligned therewith, the length of said cross-head exceeding the width of said slot, and a vertically extending non-rotatable member carried by said other member above and adjacent said cross-head and adapted to enter said slot, the horizontal cross-section of said non-rotatable member being substantially the same as the maximum horizontal cross-section of said cross-head.

2. Means for coupling two members vertically comprising a wall in one of said members having an elongated slot therethrough, a vertically extending rod rotatably mounted on the other member, an elongated, enlarged tapered head on one end of said rod adapted to enter said slot when aligned therewith, and a non-rotatable member carried by said other member about said rod and terminating adjacent said head and adapted to enter said slot, the horizontal cross-section of said non-rotatable member being substantially the same as the maximum horizontal cross-section of said head, the length of said head being less than the length of said slot but greater than the width thereof, whereby when said head and non-rotatable member enter said slot, rotation of said rod until said head traverses said slot effects coupling while said non-rotatable member remains in said slot.

3. In combination, a lifting frame, a container and means removably coupling the frame to the container, said means comprising at least one elongated slot in the upper end of said container, a T-bolt rotatably mounted on and depending from said frame, the head of which is tapered and has a length less than that of the slot but greater than the width thereof and adapted to enter said slot when aligned therewith, and a non-rotatable member fixed to the frame and terminating above and adjacent said head and adapted to enter said slot, whereby in the coupled position said non-rotatable member extends into said slot and said head extends into the container and traverses said slot and in the uncoupling position said head and non-rotatable member are in vertical registry with the periphery of said non-rotatable member being in substantial vertical alignment with the outermost periphery of said head.

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4. Means removably coupling a container on a flat member comprising at least one elongated slot opening through the lower end of said container, a block secured to said flat member and having an upper portion extending into said slot, a vertical pin rotatably mounted in said block extending through said upper portion and having a tapered cross-head at its upper end disposed in said container beyond said slot, said cross-head having a length less than that of the slot but greater than the width thereof and a maximum horizontal cross-section substantially the same as that of said upper portion of said block, and means to rotate said pin and cross-head whereby said cross-head traverses said slot in the coupled position and is in vertical registry with said upper portion of said block in the uncoupling position.

5. The combination of claim 4 and a thrust collar intermediate the ends of said rod extending beyond the periphery of said rod.

6. The combination of claim 4 and a slot opening through a portion of said block, said rotating means including a handle connected to said rod and extending through said slot, and a keeper to releasably lock said handle in a position corresponding to the coupled position of said cross-head.

7. The combination of claim 6 wherein said keeper is an unbalanced angle bar pivoted to said block at its corner about a horizontal axis.

8. Means removably coupling one container vertically upon another container comprising at least one elongated slot opening through the lower end of the upper container and the upper end of the lower container, a spacer body interposed between said containers, the upper and lower ends of said spacer body including portions extending into said slots, a vertical pin rotatably mounted in said body and extending through said upper and lower body portions, tapered cross-heads at the ends of said pin disposed in said containers beyond said slots, each cross-head having a length less than that of its corresponding slot but greater than the width thereof and a maximum horizontal cross-section substantially the same as the horizontal cross-section of the corresponding portion at the end of said body which extends into the container slot, and means to rotate said pin and cross-heads whereby said cross-heads traverse said slots in the coupled position and are in vertical registry with said upper and lower body portions in the uncoupling position.

9. The combination of said claim 8 and a thrust collar intermediate the ends of said rod extending beyond the periphery of said rod.

10. The combination of said claim 9 and a slot opening through a portion of said body, said rotating means including a handle connected to said rod and extending through said slot, and a keeper to releasably lock said handle in a position corresponding to the coupled position of said cross-head.

11. The combination of claim 10 wherein said keeper is an unbalanced angle bar pivoted to said body at its corner about a horizontal axis.

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