July 28, 1970 A. D. SWEDA ET AL 3,521,845

CONTAINER COUPLING MECHANISM

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FIG. 1

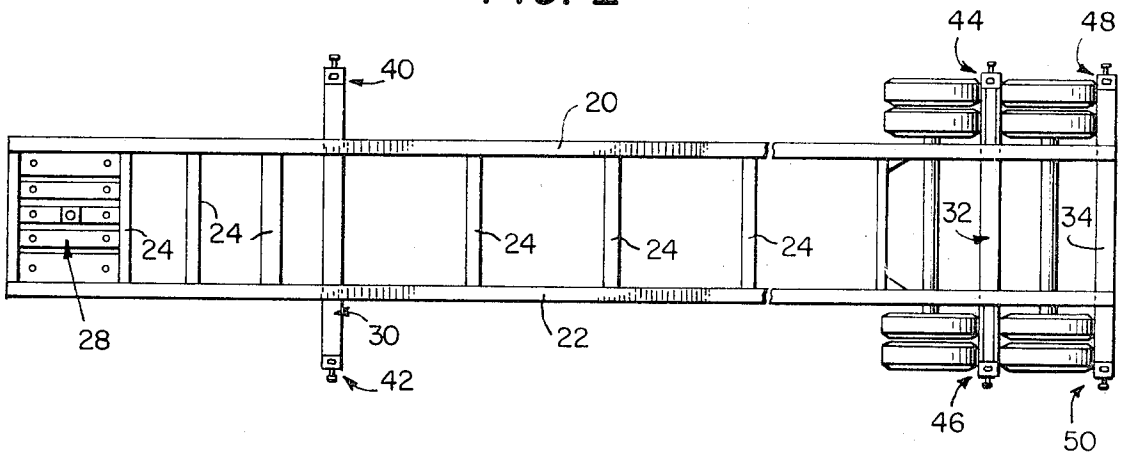


FIG. 2

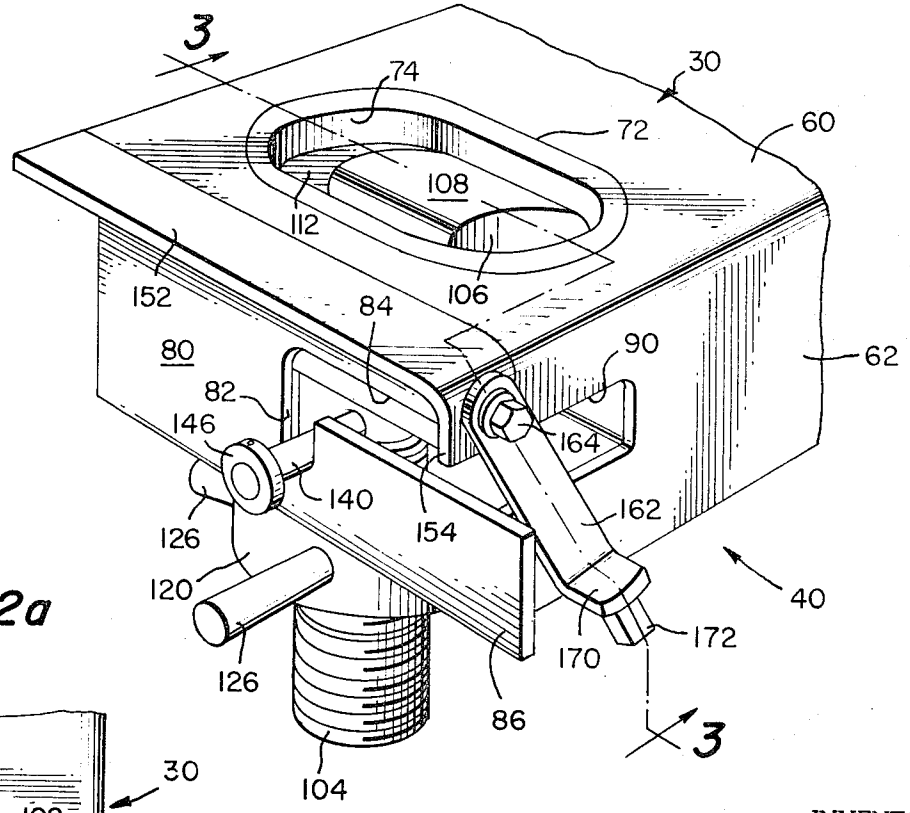
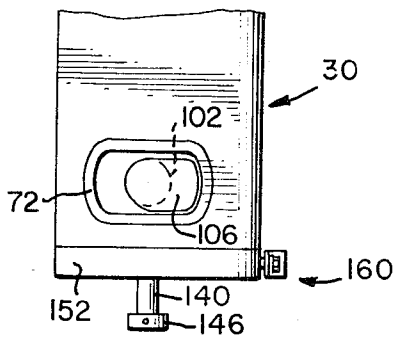


FIG. 2a



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FIG. 3

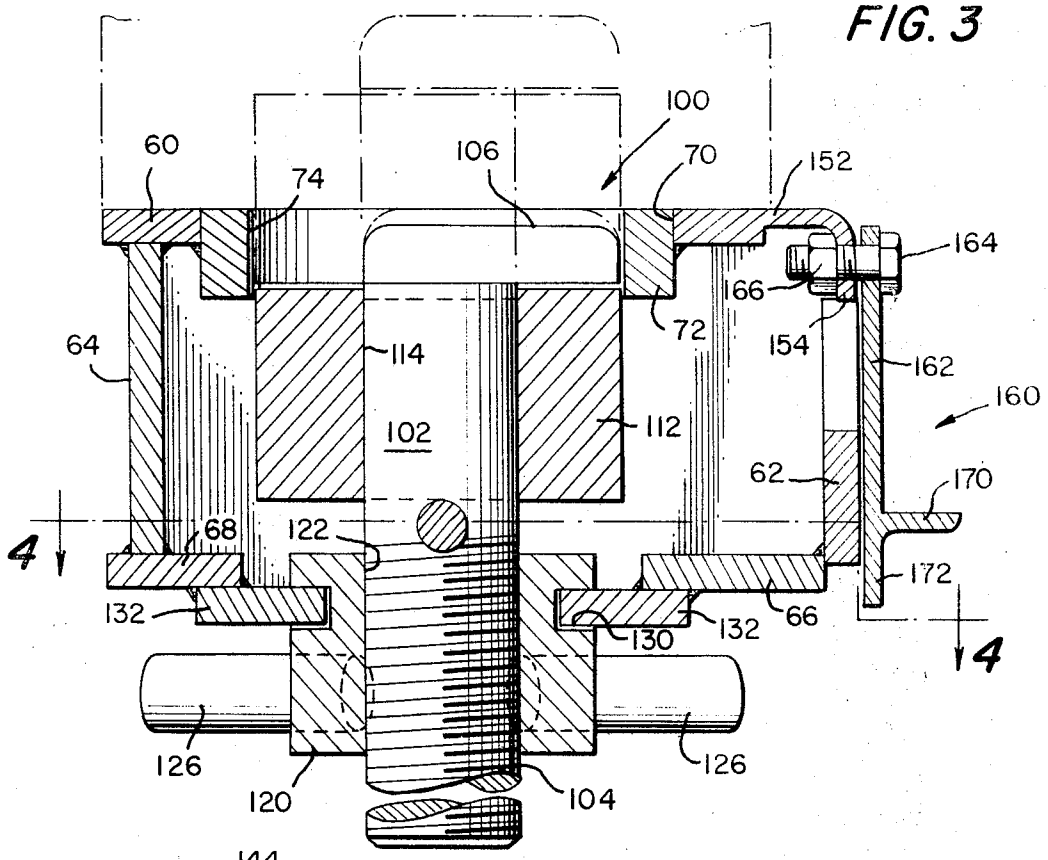
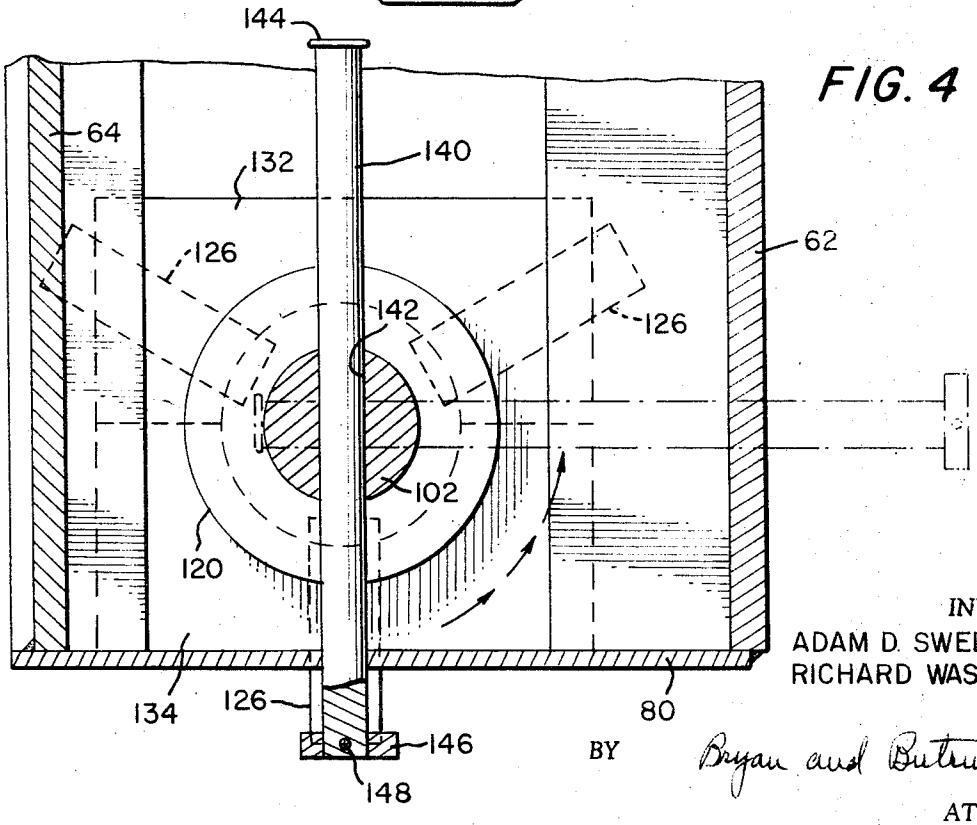


FIG. 4



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CONTAINER COUPLING MECHANISM

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FIG. 5

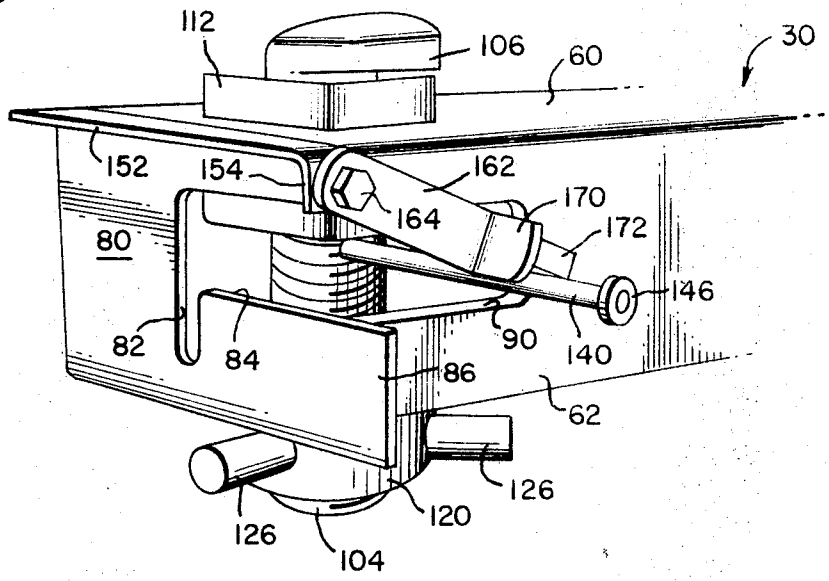
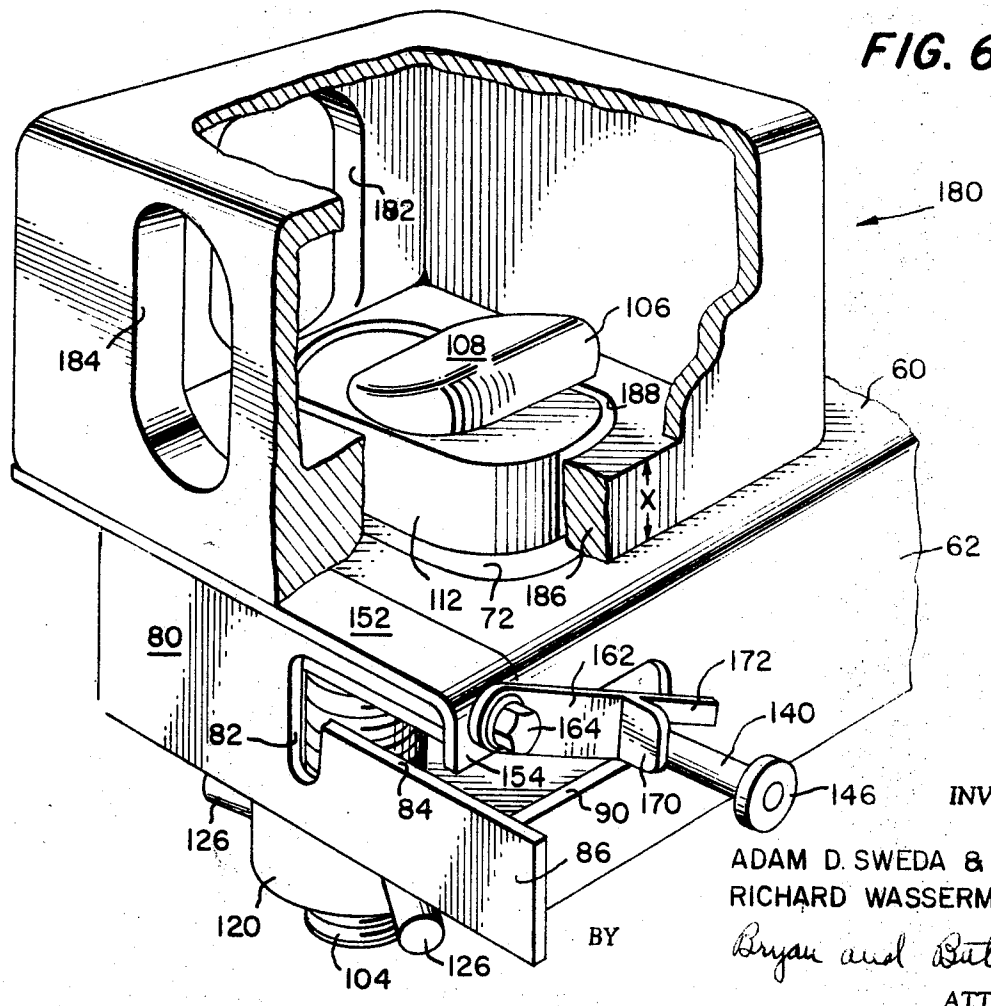


FIG. 6



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CONTAINER COUPLING MECHANISM

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FIG. 7

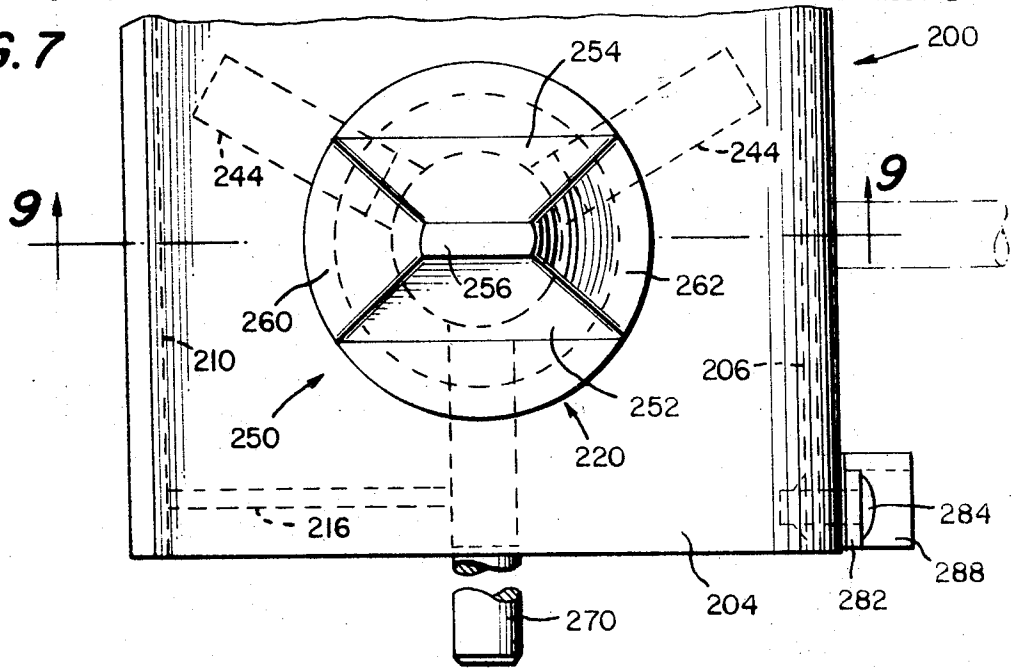
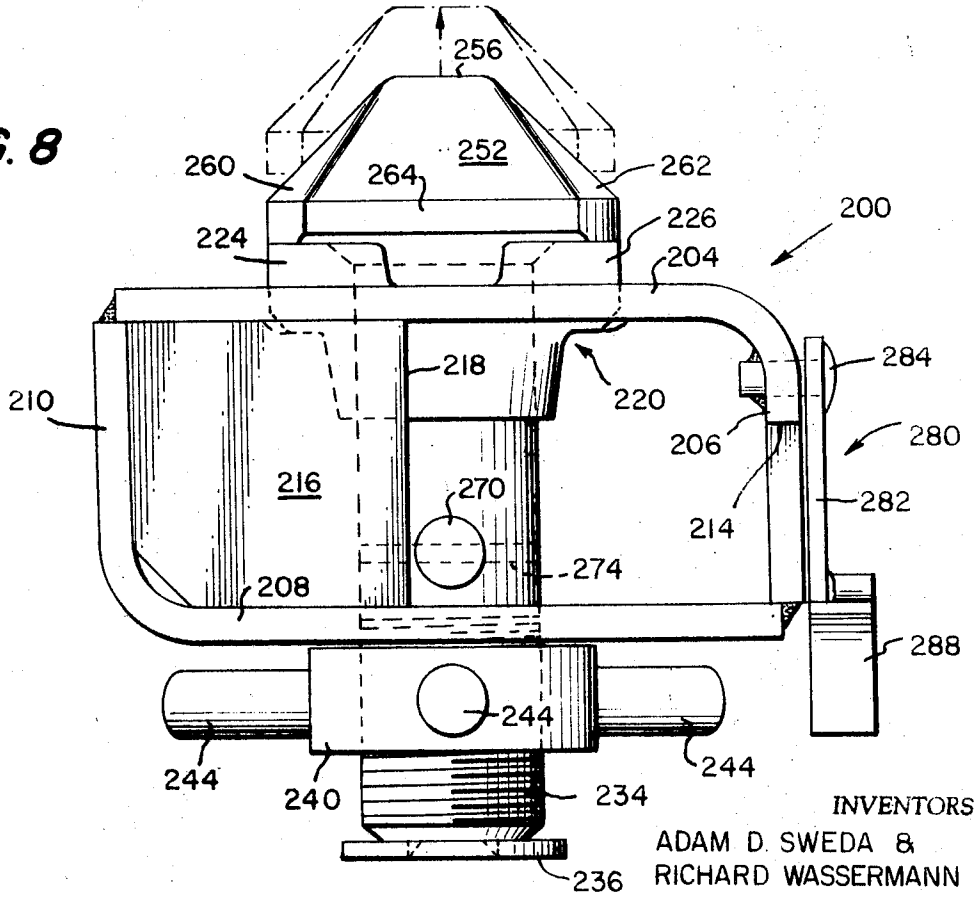


FIG. 8



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FIG. 9

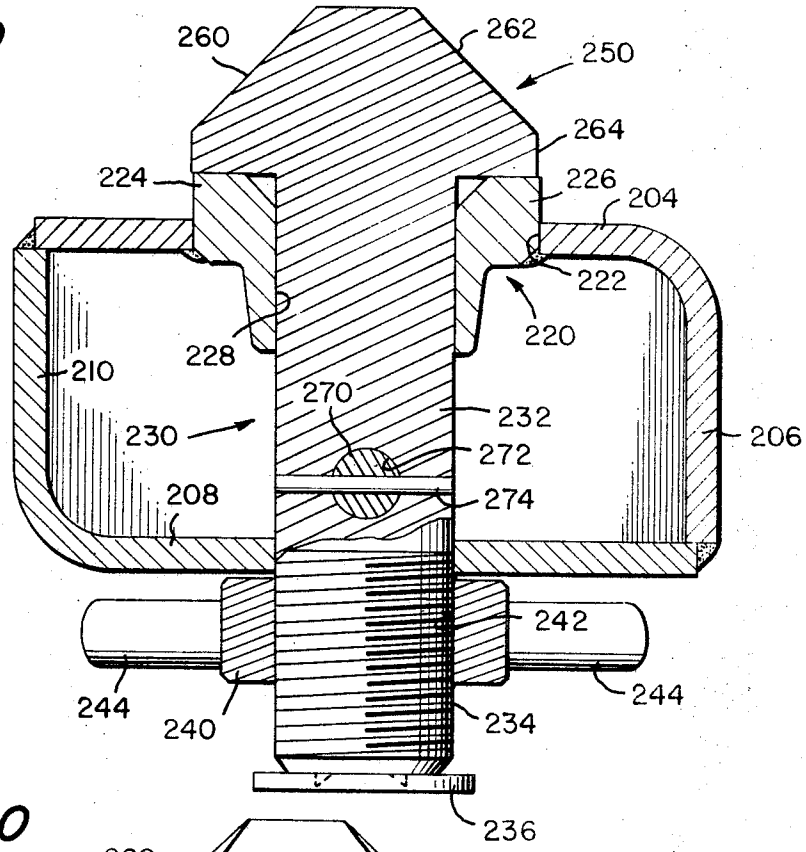
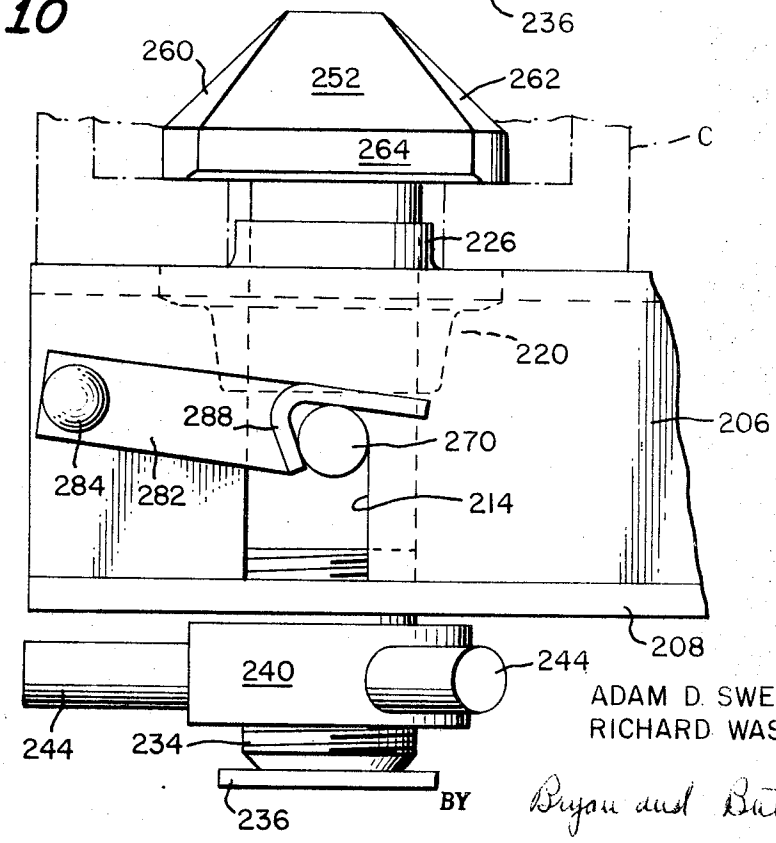


FIG. 10



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United States Patent Office 3,521,845 Patented July 28, 1970

3,521,845

CONTAINER COUPLING MECHANISM

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Filed May 24, 1968, Ser. No. 731,768
Int. Cl. B65j 1/22
U.S. Cl. 248—119 11 Claims

ABSTRACT OF THE DISCLOSURE

A lock means is carried by a supporting structure which is adapted to support a container thereon. A shear block is disposed adjacent the lock means and is received in a hole provided in the corner casting of a container. Means is provided for rotating the lock means between lock and unlock position. Separate means is also provided for vertically adjusting the position of the lock means and for forcing it downwardly to securely lock an associated container in place on the supporting structure.

BACKGROUND OF THE INVENTION

The present invention relates to a coupling mechanism which may be mounted on a suitable supporting structure such as a vehicle frame, a railway car, the deck of a ship, a loading dock and the like to positively retain a container in place on the supporting structure.

The present invention is especially adapted for use with modular sealable shipping containers of the type now in common use for shipping goods on a vehicle frame, a railway car, or by ship and the like. This type of container includes conventional corner castings having suitable holes therein to enable the containers to be readily handled and held in place on a suitable supporting structure.

The arrangement of the present invention is adapted to be utilized in many different applications as indicated hereinbefore, and is particularly suited for use on a vehicle frame such as a trailer adapted to be moved about by a conventional tractor. U.S. Pat. 3,111,341 discloses an arrangement wherein a plurality of coupling mechanisms are disposed at spaced points about the vehicle frame to permit a container to be lowered into place and held in operative position. The coupling mechanisms illustrated in this patent are quite effective in coupling containers of a standard size in place on the vehicle frame.

The principal disadvantage of the arrangement shown in this patent is the fact that corner castings provided in different types of containers have bottom walls of dissimilar thickness. Accordingly, the structure as illustrated in the aforementioned patent is suitable for use only with containers having corner castings including a particular bottom wall thickness. In actual practice, the bottom walls of corner castings on one type of container may be as much as twice as thick as the bottom walls of the corner castings on another type of container. In the absence of means for vertically adjusting the height of the coupling mechanism, the coupling mechanism as shown for example in the aforementioned U.S. patent can only be effectively used with a particular corner casting and associated container, and it is not capable of effectively clamping corner castings of other containers in place wherein the bottom wall thickness is substantially different.

U.S. Pat. 3,159,111 discloses a container coupling mechanism used in conjunction with a railway car. This patent discloses an embodiment wherein the lock members not only rotate from a lock to an unlock position, but also have a slight vertical component of movement so as to clamp an associated container in operative position.

The difficulty with the structure disclosed in this latter mentioned patent is the fact that the means for rotating the lock member into lock or unlock position also produces the vertical movement of the lock member. The swinging movement of the lock member is limited to an angle of approximately 90° thereby severely limiting the amount of vertical movement possible with such an arrangement. Accordingly, the structure as shown in this latter mentioned patent does not provide sufficient vertical adjustment of the lock member to permit its use with containers having walls of widely varying thickness. Furthermore, the lock member cannot be accurately adjusted independently of the means for moving the lock member into lock or unlock position to effectively clamp tightly in place containers having corner castings with bottom walls of any particular thickness.

SUMMARY OF THE INVENTION

In the present invention, a lock means is carried by a supporting structure and includes an adjusting means for adjusting the vertical position of the lock means with respect to the supporting structure so that the lock portion of the lock means can be accurately vertically positioned so as to engage the upper surface of the bottom wall of an associated corner casting regardless of the thickness of such bottom wall of the particular corner casting with which the apparatus is operatively associated.

Additionally, independent operating means is connected with the lock means for moving the lock means between lock and unlock positions. With this construction, the lock means may be vertically adjusted, and then moved into lock position. The adjusting means may then be further operated so as to draw the lock means downwardly to tightly and positively clamp and lock the corner casting and the associated container on the supporting structure.

Shear block means is also incorporated in the present invention and is received within a suitable hole provided in an associated corner casting whereby the shear block is adapted to absorb the shear loads from the container as encountered during shipment.

In one form of the invention, the shear block means is vertically movable with respect to the supporting structure. In this particular form of the invention, both the shear block means and the lock means may be moved vertically downwardly so as to be completely retracted below the supporting surface of the associated supporting structure. The retractable feature of this form of the invention is particularly useful in certain applications as hereinafter described.

Latch means is also provided for positively holding the lock means in its lock position so as to prevent accidental release of the lock means while in use. Means is also provided for holding the lock means and the associated operating means in unlock position.

The construction of the container coupling mechanism of the present invention is quite simple and inexpensive, and yet at the same time is quite sturdy and reliable in operation.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top view of a vehicle chassis incorporating the present invention;

FIG. 2 is a top perspective view illustrating a first form of the invention as mounted at the outer end of the bolster of a vehicle chassis illustrating the components in unlock retracted position;

FIG. 2*a* is a top view of the structure shown in FIG. 2;

FIG. 3 is a sectional view taken substantially along

line 3—3 of FIG. 2 looking in the direction of the arrows;

FIG. 4 is a sectional view taken substantially along line 4—4 of FIG. 3 looking in the direction of the arrows;

FIG. 5 is a top perspective view similar to that of FIG. 2 and illustrating the components in unlock position;

FIG. 6 is a perspective view partly broken away on an enlarged scale of the structure shown in FIG. 5 and illustrating the manner in which the coupling mechanism cooperates with a conventional corner casting of a container;

FIG. 7 is a top view of a modified form of the invention illustrating the components in unlock position;

FIG. 8 is an end view of the structure shown in FIG. 7;

FIG. 9 is a sectional view taken substantially along line 9—9 of FIG. 7 looking in the direction of the arrows; and

FIG. 10 is a side view of the structure shown in FIG. 7 and illustrating the lock means in lock position.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings wherein like reference characters designate corresponding parts throughout the several views, FIG. 1 is a top view of a trailer chassis of relatively conventional construction including a pair of longitudinally extending parallel side frame members **20** and **22** which are interconnected along the length thereof by spaced laterally extending cross members **24**. A conventional kingpin mechanism **28** is carried at the forward end of the frame for connection with a conventional tractor means.

Three laterally extending bolsters **30**, **32** and **34** are connected with the side frame members **20** and **22** and extend laterally outwardly thereof. These bolsters are of relatively conventional construction and are designed to support portions of a container which may be lowered into place on the frame and coupled thereto utilizing the container coupling mechanism of the present invention. Each bolster is formed of strong rigid members formed of steel or the like fixed to one another as by welding.

A pair of coupling mechanisms **40** and **42** are disposed at the opposite ends of bolster **30**. A similar pair of coupling mechanisms **44** and **46** are mounted at the opposite ends of bolster **32**. A further pair of coupling mechanisms **48** and **50** are disposed at opposite ends of bolster **34**.

The arrangement is such that the vehicle frame has maximum versatility. The frame is adapted to support and lock in place a first container of such a size that the corner castings of the container will be operatively associated with the coupling mechanisms **40**, **42** and **44**, **46**. The frame is also adapted to receive a container of such a size that the corner castings of the container are adapted to be operatively associated with the coupling mechanisms **40**, **42** and **48**, **50**. In the latter instance, the coupling mechanisms **44** and **46** should be retracted so as not to interfere with the undersurface of the container. The first form of the invention is retractable so that it is particularly suited for utilization with this type of arrangement.

It is of course apparent that many different kinds of frames may be employed for supporting containers, and that the coupling mechanism of the present invention may be mounted in any suitable position on frames of various construction, the arrangement as shown in FIG. 1 being merely illustrative of a particular embodiment.

Referring now to FIGS. 2–4 inclusive, the outer end of bolster **30** supporting the coupling mechanism **40** is illustrated in detail. This outer end of the bolster includes a top wall **60** upon which a container is adapted to rest, this top wall joining with a depending side wall **62** extending substantially normally to top wall **60**. The bolster includes a side wall **64** secured to the undersurface of top wall **60** and extending generally parallel with side wall **62**.

A bottom wall **66** is rigidly affixed to side wall **62**, and a spaced bottom wall **68** extends parallel with bottom wall **66** and is rigidly secured to the lower portion of side wall **64**.

The top wall **60** of the bolster has an elongated hole **70** formed therein snugly receiving a guide member **72** which is rigidly secured in place. This guide member **72** has a central elongated hole **74** formed therethrough for a purpose hereinafter described.

As seen most clearly in FIG. 2, the bolster includes an end wall **80** rigidly secured to the outer ends of the aforementioned walls. This end wall has a slot formed therein including a vertically extending portion **82** and a horizontally extending portion **84** in communication with one another. The end wall **80** also includes a portion **86** extending beyond the plane of the side wall **62**. An elongated horizontal slot **90** is formed in the side wall **62** and is in communication with the open end of slot **84** formed in the end wall **80**.

As seen in FIG. 3, a lock means is indicated generally by reference numeral **100** and includes an elongated substantially cylindrical shank **102**, the lower end **104** of which is threaded. An enlarged lock head **106** is formed at the upper end of the lock means, this lock head extending laterally of the shank **102**. The lock head is offset with respect to the shank **102** as seen in FIG. 2*a*. The upper surface **108** of the head is of a sloping configuration as seen most clearly in FIG. 6. The undersurface of the lock head is adapted to engage the upper surface of a bottom wall of the corner casting of an associated container for locking the container in operative position.

A shear block **112** has a central hole **114** formed therethrough, this hole being cylindrical and adapted to receive the shank **102** of the lock means for relative movement. The shear block is disposed below the enlarged lock head of the lock means as seen in FIG. 3 and retained in this position as hereinafter described.

The outer surface of shear block **112** is of a configuration complementary to that of the hole **74** provided in guide member **72** and is adapted to fit closely therewithin. The intercooperation between the shear block and the guide member **72** is such that the shear block is mounted for vertical sliding movement with respect to the guide member but cannot rotate with respect thereto.

The adjusting means for adjusting the vertical position of the lock means with respect to the supporting structure comprises a generally cylindrical nut means **120** having a threaded bore **122** formed therethrough, this bore threadedly receiving the lower threaded end **104** of the lock means. A plurality of handle portions **126** are affixed to the nut means and extend radially outwardly therefrom whereby the handle portions enable the nut to be readily turned during operation of the device. These handle portions are illustrated as being three in number and substantially equally spaced about the nut means.

The upper part of the nut means **120** is provided with a peripheral groove **130** formed in the outer surface thereof. A pair of flat plates **132** and **134** are secured between the bottom walls **66** and **68** of the supporting structure. Each of these plates **132** and **134** has a substantially semicircular cutout formed therein, and the two plates cooperate with one another in such a manner as to be received in the peripheral groove formed in the nut means to retain the nut means against vertical movement. Sufficient clearance is provided between the groove in the nut means and the plates **132** and **134** to permit free rotation of the nut means with respect to these plates.

As seen most clearly in FIG. 4, the operating means of this form of the invention includes an elongated cylindrical rod **140** which extends slidably through a diametrically extending hole **142** formed in the shank **102** of the lock means. One end of member **140** is upset or otherwise enlarged as indicated by reference numeral **144** to prevent the operating means from being withdrawn from operative engagement with the shank of the lock means.

An annular member **146** is disposed about the opposite end of elongated member **140** and is secured in operative position by a pin means **148** extending through aligned holes provided in members **140** and **146**. Member **146** is adapted to be manually grasped for moving the operating means.

A member **152** is rigidly secured to the outer end of the bolster and as seen most clearly in FIG. 3 includes a depending end portion **154**. This end portion is adapted to support a latch means indicated generally by reference numeral **160** and including a body member **162**. A bolt **164** extends through aligned holes provided in body member **162** and depending end portion **154**, a nut **166** being threaded on the threaded end of the bolt for retaining the members in the operative relationship illustrated. The bolt serves to mount the latch means for swinging movement with respect to the supporting structure.

The latch means includes a stop portion **170** extending substantially normally from the main body member **162**, and an engaging portion **172** extends longitudinally from the end of the body member **162**, this portion **172** having a width less than that of the main body member **162** as seen most clearly in FIGS. 5 and 6 whereby the latch means is adapted to move into the latching position illustrated in these figures. It will be seen from FIG. 6 that when the operating member **140** is moved counterclockwise into the lock position illustrated, the latch means is adapted to drop downwardly so that portion **172** rests on the upper surface of member **140**, while the stop portion **170** extends downwardly to engage the side of portion **140** and to prevent portion **140** from rotating clockwise from the position illustrated in FIG. 6.

Referring to FIG. 2, the operating member **140** is disposed in the unlock position wherein the lock means is rotated so that the enlarged lock head thereof is so aligned with the associated shear block that the outer contour of the lock head as seen from above is disposed within the outer contour of the top of the shear block as illustrated in FIG. 2*a*, whereupon the mechanism may be moved into the retracted position as shown in FIGS. 2–4. In this retracted position, the operating member **140** is disposed at the bottom of the vertically extending portion **82** of the slot formed in end wall **80** of the bolster, thereby preventing the operating means from moving in a counterclockwise direction as seen in FIG. 2 to move the lock means toward its lock position.

The shear block and lock head of the lock means are disposed in a downward position as seen in FIG. 3 so that the lock head does not project above the upper surface of wall **60** of the supporting structure. This is accomplished by operating the nut means **120** so as to cause the lock means to move downwardly into the position shown in FIG. 3.

It will also be noted as seen in FIG. 2 that when the apparatus is in the retracted position, the latch means **160** will swing downwardly until the body portion **162** thereof engages the extension **86** of the end wall of the bolster.

When it is desired to raise the lock means into position for engaging a corner casting, the nut means is operated in such a direction so as to cause the lock means to move upwardly.

Referring to FIG. 6, a conventional corner casting is indicated generally by reference numeral **180**. This corner casting will of course be associated with one corner of a container in the usual manner. The corner casting includes a pair of holes **182** and **184** formed in the side walls thereof. The bottom wall **186** has a central hole **188** formed therein of such a configuration as to snugly receive the shear block **112** so that the shear block is adapted to take shear loads from the corner casting of the container, and further so that no relative turning movement will occur between the corner casting and the shear block.

The bottom wall of the corner casting has a certain thickness indicated by the dimension X, and in typical corner castings, this dimension may vary between 9/16 of an inch and 1⅛ inches.

Assuming that the components are initially in the operative position shown in FIG. 2, the nut means **120** is rotated so as to cause the lock means along with the associated shear block to move upwardly above the upper surface of the bolster. When the components have been raised to the desired height so that the shear block extends upwardly above the upper surface of the bolster means a distance at least as great or preferably slightly greater than the thickness of the bottom wall of an associated casting, the lock means and shear block are retained in the operative relationship shown in FIG. 2*a* whereupon a corner casting is lowered into place over the coupling mechanism.

It should also be understood that it is possible to first lower a container into place above the coupling mechanism, whereupon the coupling mechanism can be vertically raised from the retracted position shown in FIG. 2 although it is difficult to properly position the container with this type of procedure.

After the container is in place and the corner casting is operatively associated with the coupling mechanism with the corner casting receiving the shear block, the operating member **140** may be swung in a counterclockwise direction as seen in FIGS. 2 and 6 so as to move the enlarged lock head **106** of the lock means into the lock position illustrated in FIG. 6 wherein the undersurface of the lock head **106** is disposed in overlying relationship to the upwardly facing surface of the bottom wall of the casting.

When the lock member **140** has been swung into the position shown in FIG. 6, the latch means will automatically drop into the operative position illustrated to hold the operating member **140** in the lock position shown.

FIG. 5 illustrates the same interrelationship of the components of the coupling mechanism as shown in FIG. 6 in the absence of the presence of an associated corner casting.

Nut means **120** may then be operated in such a direction as to draw the lock means downwardly thereby enabling a very strong clamping force to be applied to the corner casting to securely retain the associated container in operative position.

It should be understood that all of the various coupling mechansms **40**, **42**, **44**, **46**, **48** and **50** are of substantially identical construction, and accordingly the detailed description of the coupling mechanism **40** will suffice for all of the various coupling mechanisms.

In this form of the invention, the shear block is vertically adjustable concomitantly with the lock means. Accordingly, maximum shear block height is always provided which will be equal to the thickness of the bottom wall of the associated casting. In prior art systems employing a shear block of fixed vertical height, the shear block usually has a relatively small vertical dimension on the order of one-half inch and the shear block accordingly will not have maximum height in those cases wherein the thickness of the bottom wall of the associated casting exceeds one-half inch.

Additionally, it is possible with this form of the invention to raise the lock means and the shear block to its highest elevation even when loading a container having a corner casting having a thin bottom wall in order to provide maximum guidance for locking the container as it is dropped into place.

Referring now to FIGS 7–10 inclusive, a modified form of the invention is illustrated. A bolster indicated by reference numeral **200** includes a top wall **204** which joins with a depending side wall **206**. A bottom wall **208** joins with a side wall **210**, one edge of bottom wall **208** being rigidly secured to the bottom edge of the side wall **206**, and the upper edge of side wall **210** being rigidly secured to one edge of the top wall **204**. A slot **214** is formed in the lower outer end of side wall **206** as seen in FIG.

10. An end wall **216** is secured to the outer end of the bolster and includes a vertically extending end edge **218**.

A shear block indicated generally by reference numeral **220** is snugly received within a hole **222** formed in the top wall **204** of the bolster, the shear block being rigidly secured in the operative position illustrated. The shear block includes a pair of spaced upwardly extending portions **224** and **226** which have an outer configuration corresponding to the outer configuration of the enlarged lock head of the lock means hereinafter described. A central hole **228** is formed through the shear block for receiving a portion of the lock means.

The lock means is indicated generally by reference numeral **230** and includes an elongated generally cylindrical shank **232** which is slidably positioned within the hole formed in the shear block. The lower end **234** of the shank is threaded, and a stop plate **236** is rigidly secured to the lower end of the shank and extends laterally thereof.

The adjusting means in this form of the invention includes a nut means **240** having a threaded bore **242** formed therethrough which threadedly receives the lower threaded end **234** of the shank of the lock means.

A plurality of operating handles **244** are secured to the nut means and extend radially outwardly therefrom, these handle portions being for example three in number and substantially equally spaced about the nut means to facilitate operation thereof.

The lock means includes an enlarged lock head indicated generally by reference numeral **250** and being generally pyramidal in shape. This lock head as seen most clearly in FIG. 7 includes upwardly convergent side walls **252** and **254** which terminate in a generally rectangular top face **256**. Opposite ends **260** and **262** of the lock head are of upwardly convergent conical section terminating in the aforementioned top face **256**. A vertically extending edge face **264** extends around the lower periphery of the enlarged lock head.

As seen in FIG. 7, it should be understood that the spaced portions **224** and **226** of the shear block underlying opposite ends of the enlarged lock head are of the same plan configuration so that the lock head and shear block are adapted to fit within a hole formed in a corner casting having substantially the same outer shape as the lock head as seen in FIG. 7.

The operating means in this form of the invention includes an elongated operating rod **270** which is disposed within a hole **272** extending diametrically through the shank **232** of the lock means. The operating rod **270** is retained in the operative position illustrated by a pin means **274** as seen in FIG. 9 which extends through aligned holes formed in the operating rod and the shank of the lock means.

A latch means is indicated generally by reference numeral **280** and includes a body portion **282** the upper end of which is swingably supported by a rivet or other suitable member **284**. This rivet extends through a hole provided in the side wall **206** and is rigidly affixed in position.

The latch means includes a curved end portion **288** secured to the outer end of the body portion **282**, this curved outer end portion serving to lock the operating member **270** in lock position as shown in FIG. 10.

In this form of the invention, the lock means is shown in its lowermost position in FIG. 9. When it is desired to vertically adjust the lock means, the nut means **240** is backed off so as to move downwardly as seen in FIG. 9 thereby permitting the lock means **230** to be pushed vertically upwardly to the desired vertical height. When the lock means has been moved vertically upwardly within a corner casting to a position so that it may be moved into lock position, the operating member **270** is swung in a counterclockwise direction as seen in FIG. 7 so as to move it into the operative position illustrated in FIG. 10 wherein the lock means has been rotated 90° from the position shown in full lines in FIGS. 7, 8 and 9.

The nut means **240** may then be moved upwardly so as to engage the undersurface of the bottom wall **208** of the bolster. Further rotation of the nut will tend to pull the lock means downwardly so as to apply a strong force against the associated corner casting to tightly clamp the corner casting in place and securely lock it to the supporting structure. An associated corner casting is indicated by phantom line C in FIG. 10 of the drawings illustrating the manner in which this form of the invention is adapted to couple a container to the supporting structure.

The stop plate **236** secured to the lower end of the lock means prevents the nut means **240** from being threaded off of the lock means and displaced therefrom. In connection with the modification illustrated in FIGS. 7–10 inclusive, it will be noted that the shear block and the lock means cannot be retracted down below the upper surface of the associated supporting structure. Accordingly, this type of installation will be employed only at those points where a corner casting of an associated container is adapted to be coupled to the coupling mechanism of the present invention.

It will be noted that the edge **218** of the end wall **216** of the bolster will limit movement of the operating member **270** in one direction, while the end of the slot **214** formed in the side wall **206** of the bolster will limit movement of the operating member in the opposite direction.

As this invention may be embodied in several forms without departing from the spirit or essential characteristics thereof, the present embodiment is therefore illustrative and not restrictive, and since the scope of the invention is defined by the appended claims, all changes that fall within the metes and bounds of the claims or that form their functional as well as conjointly cooperative equivalents are therefore intended to be embraced by those claims.

What is claimed is:

1. Container coupling mechanism including supporting structure, lock means movably carried by said supporting structure and including a lock portion, shear block means disposed adjacent said lock means for reception in a portion of an associated container, said shear block means being disposed vertically below the lock portion of said lock means, said shear block means having a central hole formed therethrough, said lock means including an elongated shank, said shank extending through said hole in the shear block means, said lock portion comprising an enlarged lock head extending laterally from said shank, the lower end of said shank being threaded, adjusting means for adjusting the distance of said lock portion from said support structure and comprising nut means threaded on the lower end of said shank, and independent operating means for moving said lock means between lock and unlock positions, said operating means being operatively connected with said lock means and extending laterally therefrom, said operating means being adapted to cooperate with position maintaining means to maintain the operating means and the lock means in position.

2. Apparatus as defined in claim **1** including stop means carried at the lower end of the shank of said lock means for limiting downward movement of said nut means with respect to said shank.

3. Apparatus as defined in claim **1** wherein said operating means extends outwardly of a part of said supporting structure.

4. Apparatus as defined in claim **1** wherein said operating means is slidable with respect to said shank.

5. Apparatus as defined in claim **1** wherein said operating means is fixed to said shank.

6. Apparatus as defined in claim **1** wherein said position maintaining means comprises latch means for en-

gaging said operating means for maintaining the operating means in lock position.

7. Apparatus as defined in claim 1 wherein said shear block means is vertically movable with respect to said supporting structure but is held against rotation with respect thereto.

8. Apparatus as defined in claim 7 wherein said supporting structure includes a hole for receiving said shear block means, said shear block means being slidably disposed within said hole, the shear block means being positioned between the enlarged lock head of the lock means and said operating means.

9. Apparatus as defined in claim 1 wherein said shear block means is fixedly secured to said supporting structure.

10. Apparatus as defined in claim 1 wherein said position maintaining means includes a vertically extending slot portion formed in said supporting structure for receiving said operating means to hold the operating means in unlock position.

11. Container coupling mechanism including supporting structure, lock means movably carried by said supporting structure and including a lock portion, adjusting means for adjusting the distance of said lock portion from said support structure, independent operating means for moving said lock means between lock and unlock positions, said lock means including an elongated shank, said lock portion comprising an enlarged lock head extending laterally from said shank, the lower end of said shank being threaded, said adjusting means comprising nut means threaded on the lower end of said shank, and means for preventing vertical movement of said nut means including a groove formed in said nut means, said groove receiving a portion of said supporting structure.

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