United States Patent [19]

Wyon

[11] 3,751,096

[45] Aug. 7, 1973

[54] **TWISTLOCK DEVICE FOR LOAD HANDLING APPARATUS**

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[22] Filed: **Feb. 7, 1972**

[21] Appl. No.: **223,906**

[30] **Foreign Application Priority Data**

Feb. 11, 1971 Great Britain 4,452/71

[52] **U.S. Cl.** ..... **294/67 R,** 24/221 R, 294/81 SF

[51] **Int. Cl.** **B66c 1/22**

[58] **Field of Search** ..... 294/67 R, 67 DA, 294/81 SF; 24/221 R, 221 K; 105/366 E, 366 B, 366 C; 248/119 R, 361 R; 296/35 R, 35 A

[56] **References Cited**

UNITED STATES PATENTS

3,593,387 7/1971 Georgi 24/221

3,428,354 2/1969 Griffith ..... 294/67 R

FOREIGN PATENTS OR APPLICATIONS

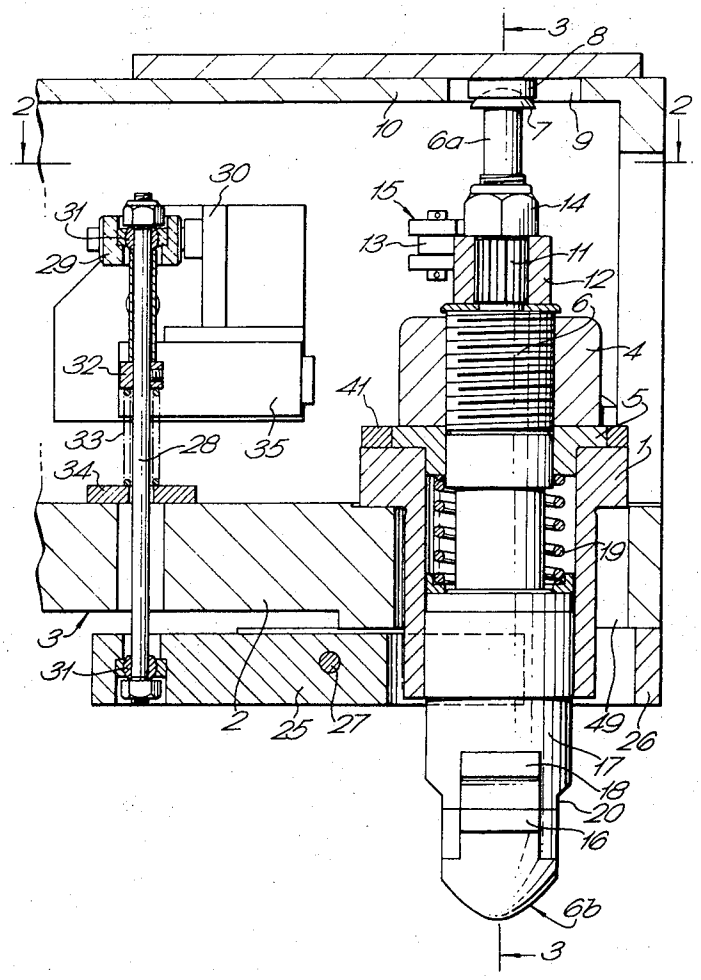
1,805,530 11/1969 Germany ..... 294/67 R

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Assistant Examiner—Johnny D. Cherry
Attorney—Baldwin, Wight and Brown

[57] **ABSTRACT**

A twistlock device for use in handling load handling containers of the type used in I.S.O. and "Sealand" systems, comprising first engagement means suitable for I.S.O. castings, and second engagement means suitable for "Sealand" castings, wherein said first and second engagement means are in co-axial relationship with one another, and are releasably engageable with one another, so that they can be angularly turned in unison, or one relative to the other.

19 Claims, 8 Drawing Figures



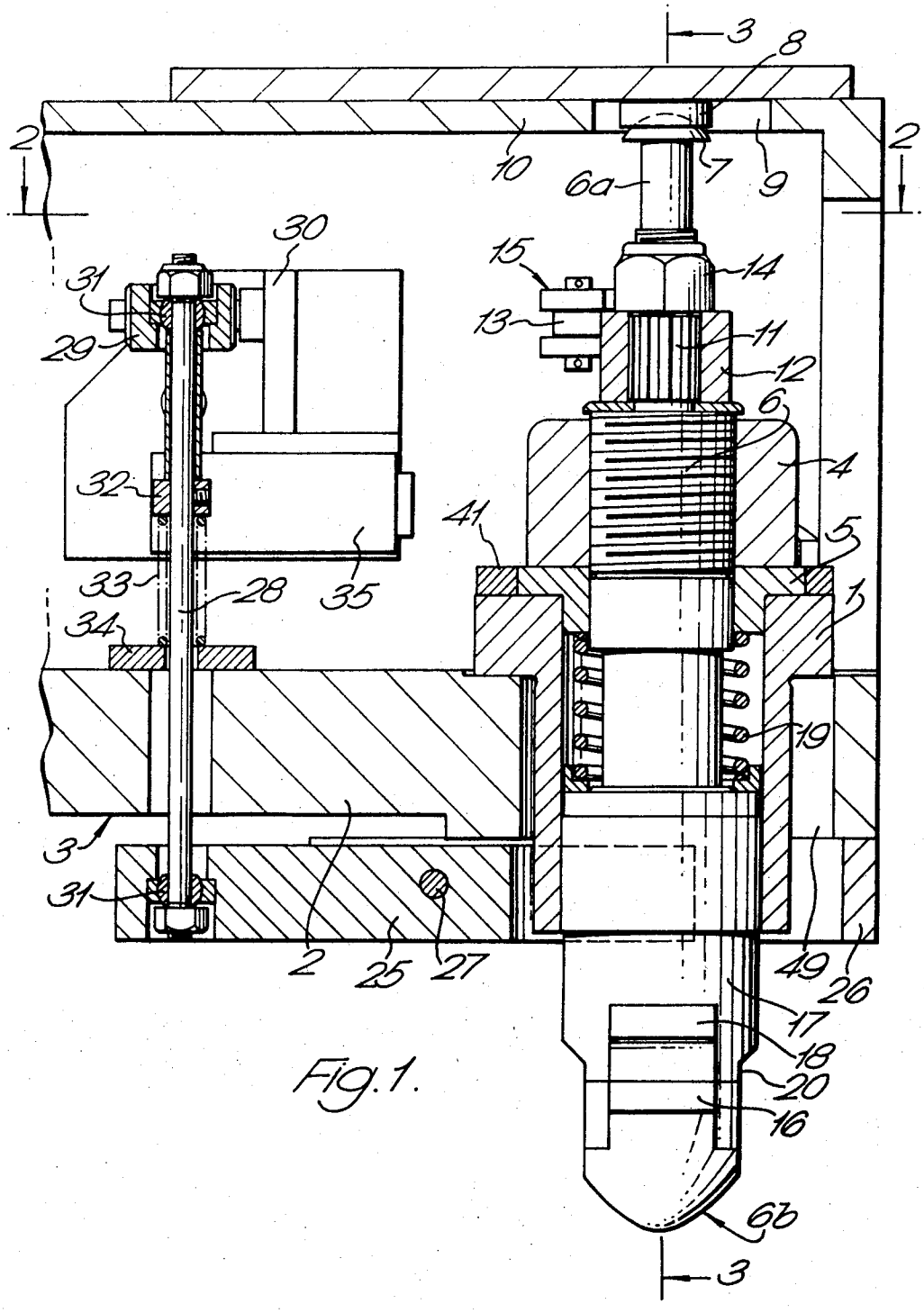

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Fig. 1.

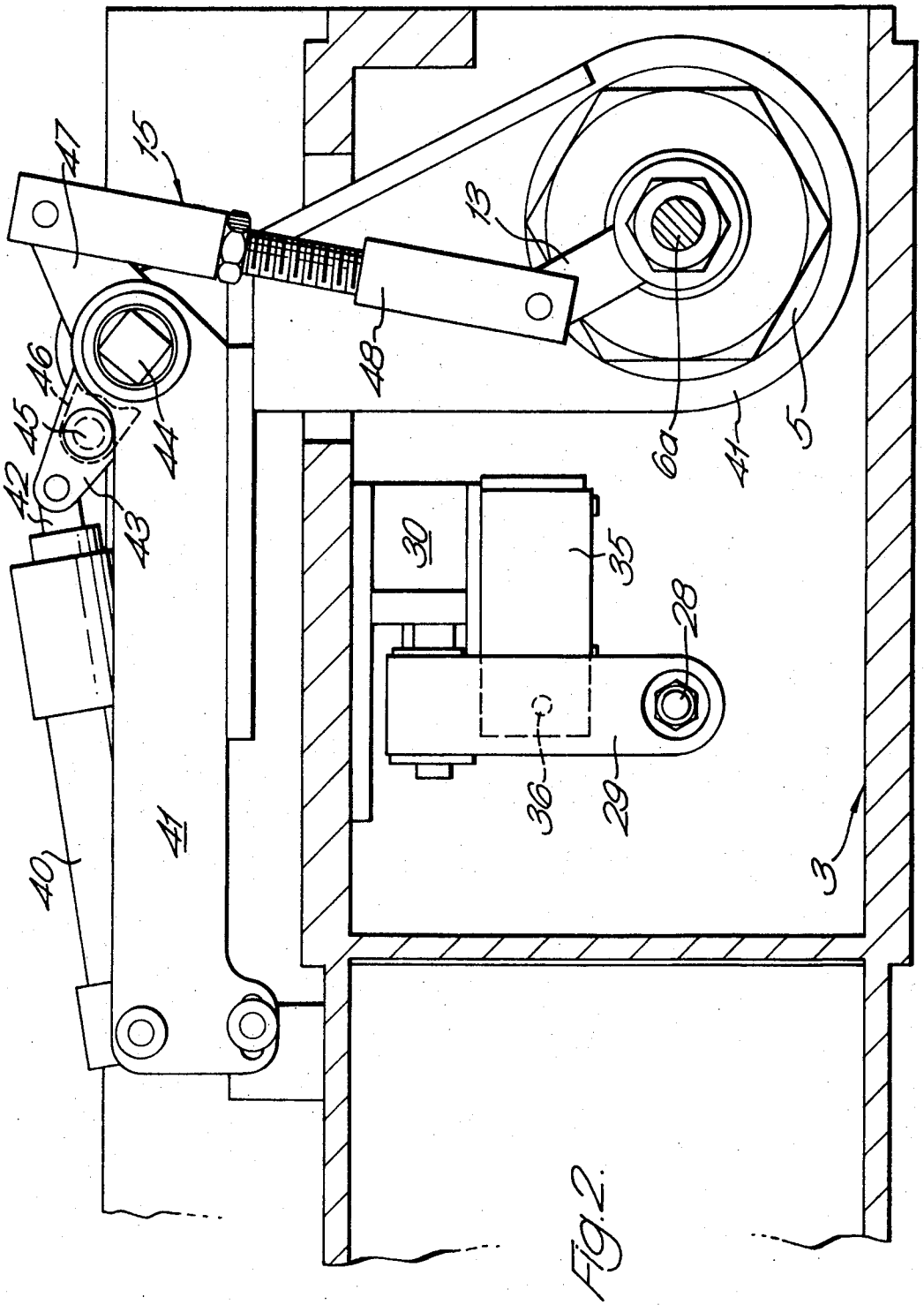


FIG. 2.

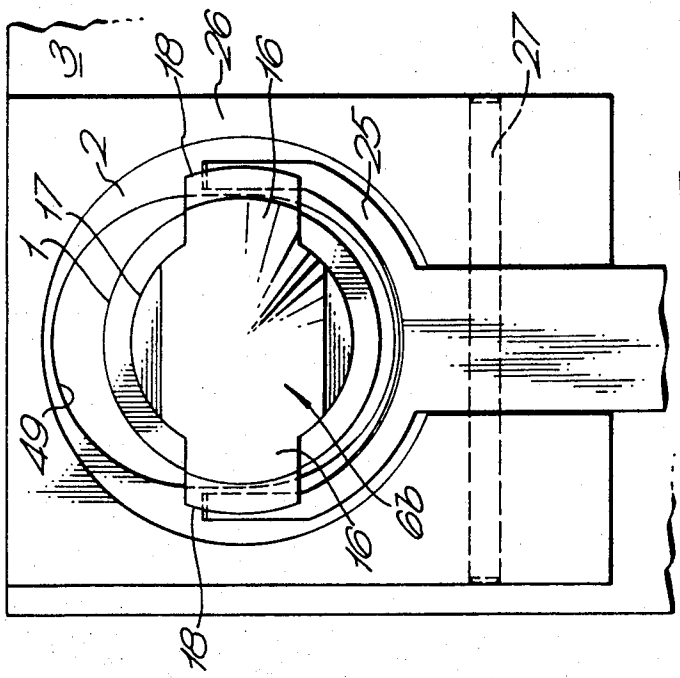
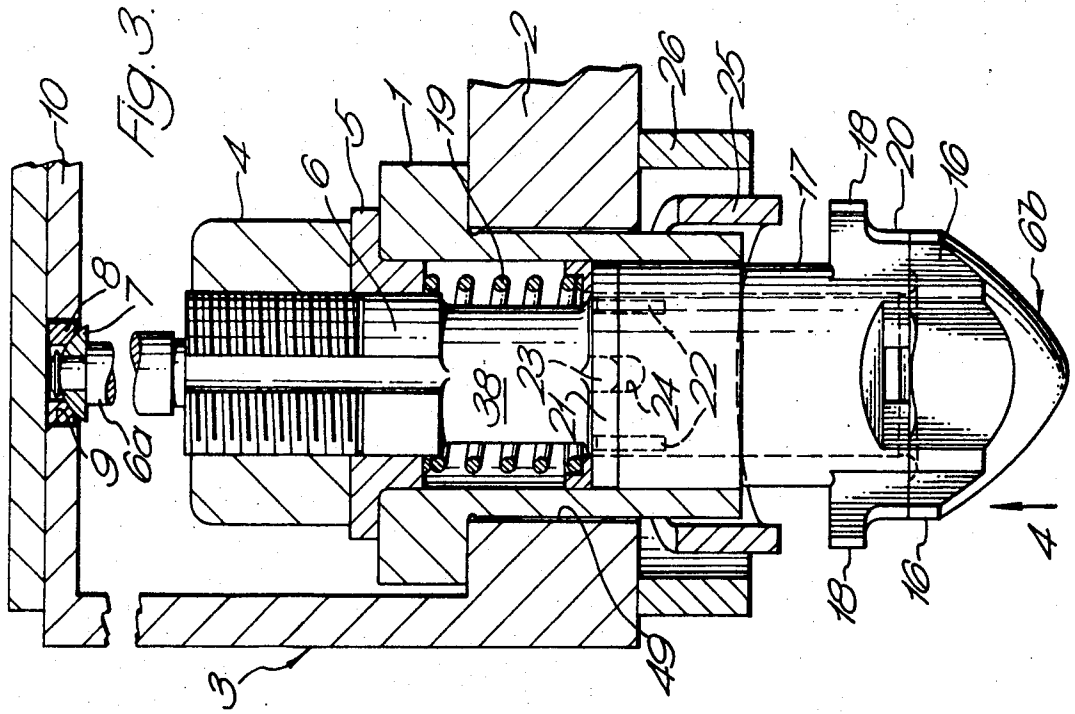

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FIG. 4.

FIG. 3.


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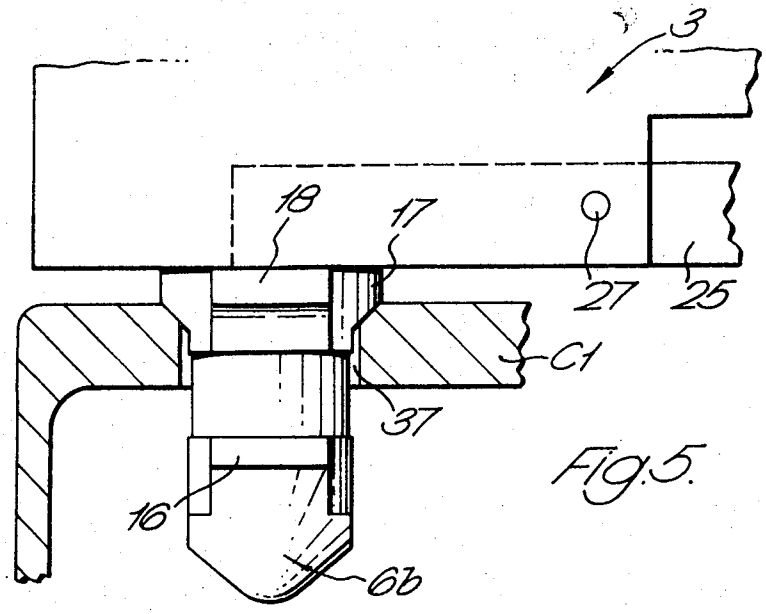


Fig.5.

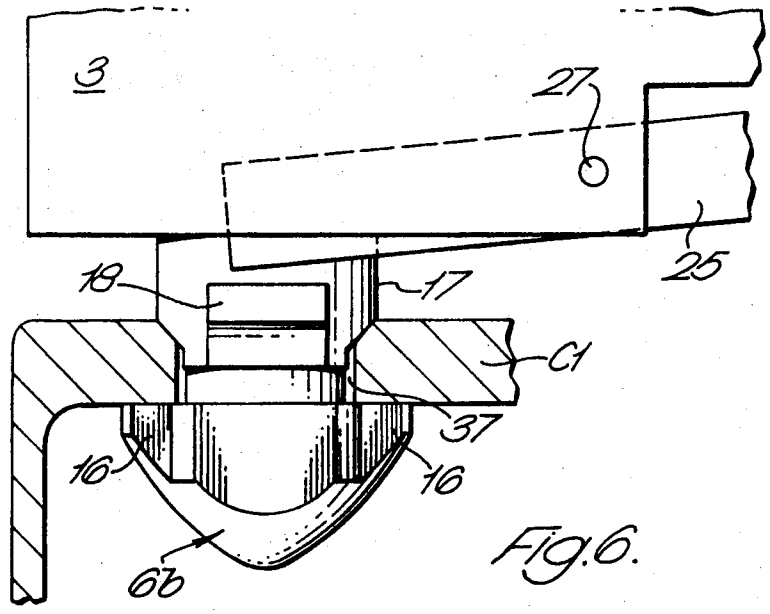


Fig.6.

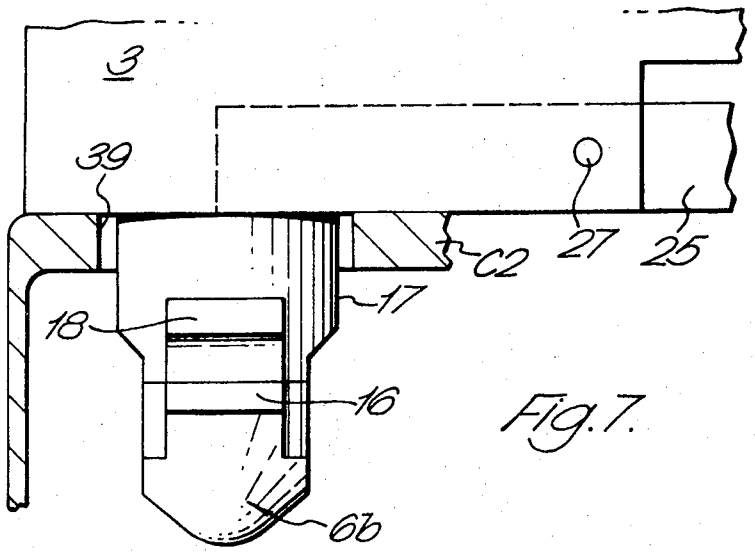


Fig. 7.

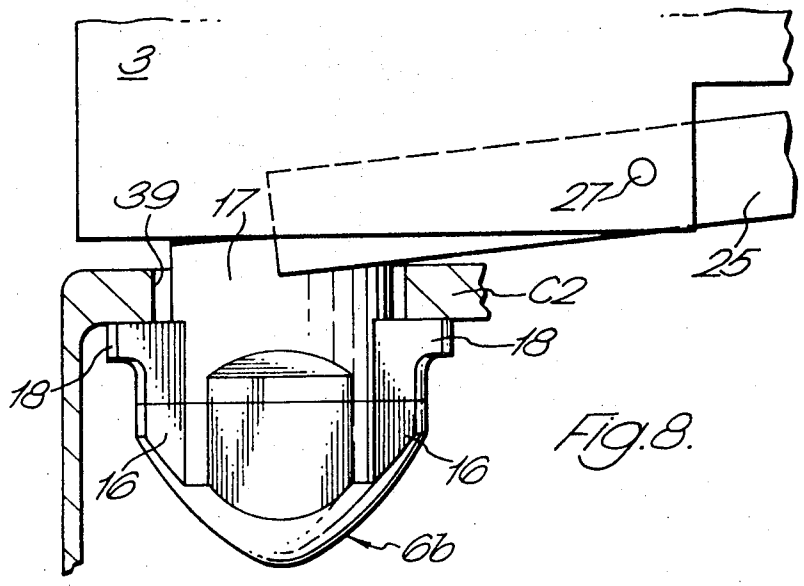


Fig. 8.

TWISTLOCK DEVICE FOR LOAD HANDLING APPARATUS

This invention relates to a twistlock device for load handling apparatus with particular reference to such devices for use on the spreaders of container handling equipment.

It has now become almost standard practice when lifting containers from the top, for example by container handling cranes, to use so-called twistlocks which are adapted to engage apertured castings provided on the containers. However there are several container systems in current use, these having different sizes and shapes of apertured castings and different lifting centres. Therefore difficulties can arise in the mixed handling of containers.

Two widely used container systems which are encountered in mixed handling operations are the International Standards Organisation system (hereinafter referred to as the I.S.O. system) and the "Sealand" system.

Containers of the I.S.O. system are of various heights and lengths, but are of the same width, whereas containers of the "Sealand" system, though being of one intermediate length, are of similar width to those of the I.S.O. system but have slightly different transverse lifting centres. The differences in length of the containers can be catered for by means, for instance, of a telescopic type lifting spreader.

However, a problem exists in that the corner castings used in the two systems differ in inside depth, in the shape and size of the top aperture, in the casting thickness of the aperture face, and in the proximity of the casting wall to the aperture. Therefore, the form of twistlock needed for top-lift handling of containers of the two systems is also at variance. Several forms of universal twistlock for container handling spreaders have been proposed, but all of these fail to take into account all of the differences which exist. Thus, for example, due to the different internal dimensions of the corner castings, the size and the form of the twistlock head with its supporting lugs differs from one system to the other with the result that, if the twistlock head of one system is varied in size in an attempt to make it usable with the corner casting of either system, the tips of the lugs will tend to contact the internal radius of the casting with the one system while having much reduced bearing area with the other system. Such conditions will accelerate wear of the lugs and, at the same time, seriously increase the chance of the full weight of a container being taken on the extreme edge of one lug instead of being more evenly distributed over the faces of both lugs: either of these possibilities is dangerous.

It is among the objects of the present invention to provide a twistlock device which avoids, or substantially reduces, these and other inherent disadvantages of known universal twistlock devices, and to provide a twistlock device which can be used with containers of both the I.S.O. and the "Sealand" systems.

Acccording to the present invention, there is provided a twistlock device for use with containers of the I.S.O. and "Sealand" systems which comprises first engagement means suitable for I.S.O. castings and second engagement means suitable for "Sealand" castings, wherein the two engagement means are in co-axial alignment with one another and are releasably engageable with one another whereby, in use, they can be

turned about their longitudinal axes either in unison or relative to one another.

Preferably, the first engagement means comprise a head provided on a shaft and having oppositely extending lugs, and the second engagement means comprise a sleeve which is slidably mounted on the shaft and is formed with oppositely extending lugs which co-act with the lugs on the head.

The invention is illustrated by way of example in the accompanying drawings in which,

FIG. 1 is a vertical section through a twistlock device according to the invention shown in position on a container handling spreader,

FIG. 2 is a plan view on the line 2—2 of FIG. 1,

FIG. 3 is a section on the line 3—3 of FIG. 1 but with the operating mechanism omitted,

FIG. 4 is an elevation in the direction of the arrow 4 of FIG. 3,

FIG. 5 is an elevation of the device shown in its entry position in an I.S.O. type corner casting,

FIG. 6 is an elevation corresponding to FIG. 5 with the device in its lifting position,

FIG. 7 is an elevation of the device shown in its entry position in a "Sealand" type corner casting, and

FIG. 8 is an elevation corresponding to FIG. 7 with the device in its lifting position.

Referring to the drawings, the twistlock device comprises a tubular bearing 1 adapted to be supported in the lower part 2 of the frame 3 of a load handling apparatus, such as the spreader of a container handling crane.

Supported within the bearing 1 by means of a nut 4 engaging a bush 5 is a shaft 6. The upper end 6*a* of the shaft 6 is of reduced cross-section and is provided with a spherical bearing 7 which co-acts with a bearing bush 8 arranged in a slot 9 of the upper part 10 of the frame 3 of the load handling apparatus. The upper end 6*a* of the shaft 6 is also formed with a spline 11 over which the boss 12 of a twistlock drive lever 13 is positioned, and retained by a nut 14, the drive lever 13 being coupled to a twistlock operating mechanism generally indicated at 15. The lower end of the shaft 6 is formed with a head 6*b* having oppositely extending lugs 16. The head 6*b*, which is such as to fit into both I.S.O. and "Sealand" type corner castings, is of a size to properly engage I.S.O. castings and thus lift containers with safety, but the lugs 16 thereof are of insufficient length to properly engage "Sealand" castings and therefore they cannot lift "Sealand" containers with complete safety.

Slidably mounted between the tubular bearing 1 and the shaft 6 is a sleeve 17 the lower end of which is formed with oppositely extending lugs 18. The lugs 18 are of a larger radius than the lugs 16 of the head 6*b* and are of a size to properly engage "Sealand" corner castings. The sleeve 17 is strongly biassed, by means of a coiled compression spring 19, in a downward direction onto the head 6*b* on which it is supported. The outside diameter of the sleeve 17 is of suitable size to provide location means when the device is used with "Sealand" castings, but the lower end 20 thereof is shaped to correspond to that of the head 6*b* which allows the sleeve 17 to partially enter into I.S.O. castings thereby providing location means when the device is used with I.S.O. castings.

A drive ring 21 is fixed, as by pins 22, to the upper end of the sleeve 17, the ring 21 being formed with one

or more inwardly directed projections 23 which engage a corresponding groove or grooves 24 formed in the shaft 6 so that, in the position shown in FIG. 3 of the drawings, the shaft 6 and the sleeve 17 are locked together against relative rotation.

The arrangement further includes a probe in the form of a forked lever 25, the operative end of which partially surrounds the bearing 1 and is protected by a corner plate 26. The probe lever 25 is hingedly mounted at 27 on the plate 26 and is coupled at its free end, by means of a rod 28, to a slave lever 29 which is hingedly mounted on a bracket 30 secured to the frame 3. The connections between opposite ends of the rod 28 and the levers 25 and 29 are in the form of spherical bearing joints 31 as is shown in FIG. 1.

The rod 28 is further provided with a collar 32 and a compression spring 33 is arranged to extend between the collar 32 and a bearing plate 34 fixed to the frame 3 so that the rod, and thus also the lever 29 and the probe 25, are biased into an inoperative position where the forked end of the probe lever 25 projects below the cover plate 26.

Also mounted on the bracket 30 is a limit switch 35, the actuating plunger 36 of which is operated by the lever 29 for the purpose hereinafter described.

In operation, in order to handle I.S.O. containers, a part of one corner casting of which is shown at C1 in FIGS. 5 and 6, the device is lowered into an aperture 37 of the casting C1 until the sleeve 17, after having partially entered the aperture 37, engages the casting C1. Further downward movement will cause the sleeve 17 to move relative to the shaft 6 against the action of the spring 19. This movement causes the projections 23 on the drive ring 21 to move out of their co-acting slots 24 in the shaft 6 to a position where they are adjacent a portion 38 of the shaft 6 which is of reduced diameter. In this position relative rotational movement is permitted between the shaft 6 and the sleeve 17.

The latter downward movement also results in the head 6b with its lugs 16 being placed in a position below the top wall of the casting C1 as is indicated in FIG. 5. As is also shown in FIG. 5, the downward movement also causes the lugs 18 of the sleeve 17 to engage the probe 25 and to move it about its pivot 27 into a horizontal position. This in turn moves the rod 28 downwards against the action of the spring 33 and pivots the slave lever 29 so that it engages the actuating plunger 36 of the limit switch 35. This action completes an electric circuit to the operating mechanism 15. In this position the shaft 6 is turned through 90° by the operating mechanism 15 and, as the weight is taken up, the lugs 16 engage the underside of the top wall of the casting C1 as is shown in FIG. 6. At the same time, the probe 25, under the action of the spring 33, returns to its original position as shown in FIG. 6 thereby breaking the circuit to the mechanism 15 to prevent the latter being operated during the lifting operation.

In order to handle "Sealand" containers, a part of one corner casting of which is shown at C2 in FIGS. 7 and 8, the device is again lowered into an aperture 39 of the casting to the position shown in FIG. 7. In this case however, both the head 6*b* and the lower end of the sleeve 17 extend into the casting, the main diameter of the sleeve 17 providing the necessary location means as compared with lower end 20 which provides the necessary location means when the device is used with I.S.O. containers.

In this position, with the probe having been operated in the manner hereinbefore described, the operating mechanism 15 turns both the shaft 6 and the sleeve 17, which are locked against relative rotation by the means 23, 24, through 90° so that the lugs 18 of the sleeve 17 engage under the top wall of the casting C2.

Thus, it will be appreciated that the invention provides a device which completely takes into account the difficulties presented by the difference in sizes etc. existing between I.S.O. and "Sealand" corner castings and enables containers of the two systems to be handled with safety.

With regard to the operating mechanism 15 this, as can be seen in FIG. 2, comprises an hydraulic ram 40 secured, at one end, to a bracket 41 attached to the frame 3 and mounted on the bearing 1. The ram piston rod 42 is connected to a lever 43 mounted on a lay shaft 44. The lever 43 is mounted so as to rotate relative to the shaft 44 but is normally prevented from doing so by a drive pin 45 which connects it to a drive lever 46 splined to the shaft 44. A further drive lever 47 is splined to the shaft 44 and this is connected to the drive lever 13 by an adjustable push rod 48. Thus, movement of the ram piston 42 serves to turn the shaft 6 through 90°. If, due for example to a failure in the hydraulic system, it is required to operate the twistlock manually, the drive pin can be removed and the lay shaft 44 can be turned by a spanner applied to the squared end thereof. The ram 40 is controlled by a solenoid-operated valve which, as hereinbefore indicated, is in circuit with the limit switch 35 of the probe mechanism.

In order to cater for the different transverse centres existing between the corner castings of the two systems, the bearing 1 may be supported in a slot 49 in the frame 3 with the upper end 6*a* of the shaft 6 floating as described. The device is moved to new centres by providing a taper on the head 6*b*. Thus, as the device is lowered, the weight of the frame 3 automatically causes sideways movement thereof to line up with the apertures in the castings. However, it may be expedient to centralize the device by means of springs so that the amount of movement necessary for use with either system will be limited to half the difference between the centre-to-centre spans of the castings of the two systems. Alternatively, movement into either position could be effected by hand, or by remote control with hydraulic cylinders.

It will be appreciated that the bearing area of the I.S.O. lugs 16 is reduced compared with standard fittings, but the narrowing is confined to the ends of the lugs so that the strength at the roots of the lugs is not impaired. Furthermore, the "Sealand" lugs 18 have a bearing area similar to that of the standard fitting, but the lugs are reduced in length to limit stress at the roots and allow less restricted rotation.

We claim:

1. A twistlock device for use in handling first and second containers of two known different type container handling systems, which comprises first engagement means consisting of a shaft having a head formed with two oppositely extending first lugs arranged to engage the castings of said first containers, second engagement means consisting of a sleeve formed at one end with two oppositely extending second lugs arranged to engage the castings of said second containers and being of a greater dimension transversely of said shaft than

said first lugs, said sleeve being axially slidably mounted on one end of said shaft with said first lugs and said second lugs adjacent one another.

2. A twistlock device as claimed in claim 1, including a tubular bearing bush having means for reception in the frame of a load handling spreader, said sleeve, and thus also said shaft, being received within said bearing bush.

3. A twistlock device as claimed in claim 2, including a compression spring which urges said end of said sleeve carrying said lugs into engagement with said head of said shaft.

4. A twistlock device as claimed in claim 3, including means for normally preventing relative axial turning movement between said shaft and said sleeve.

5. A twistlock device as claimed in claim 4, including means for angularly turning said shaft alone about its longitudinal axis, and for turning said shaft and said sleeve together about their common longitudinal axis.

6. A load handling spreader assembly having a frame supporting at least one twistlock device for use in handling first and second containers of two known different type container handling systems, said twistlock device comprising a tubular bearing bush supported in said spreader assembly frame, a sleeve axially slidably mounted in said sleeve and having a head formed with two oppositely extending second lugs arranged to engage the castings of said first containers and being of a smaller dimension transversely of said shaft than said first lugs, and means releaseably engaging said sleeve and said shaft for selectively angularly turning said sleeve and said shaft in unison or one relative to the other.

7. A spreader assembly as claimed in claim 6, in which there are means mounting said tubular bearing bush including a slot in said spreader frame receiving said bush for permitting sideways movement of said twistlock device.

8. A spreader assembly as claimed in claim 7, including a ram operated linkage mechanism mounted on said spreader frame and operatively coupled to said shaft for effecting angular turning movement of said shaft alone, and said shaft and said sleeve together.

9. A spreader assembly as claimed in claim 8, including a probe mechanism operatively associated with said lugs of said sleeve member.

10. A spreader assembly as claimed in claim 9, in which said probe mechanism includes switch means which are in circuit with a solenoid-operated valve controlling said ram operated linkage mechanism, whereby operation of said linkage mechanism can be effected only when said probe mechanism is operative.

11. A spreader assembly as claimed in claim 8 including a probe mechanism having a portion disposed adjacent said shaft and normally projecting below said spreader frame for actuation by a casting of one of said second containers, said probe mechanism portion being aligned with said first lugs for actuation by said first lugs when engaged by a casting of one of said first containers.

12. A twistlock device for use in the handling of containers of two known type container handling systems wherein the containers of a first of said known handling systems each has a first engaging portion with an elongated fastener receiving opening of a first size and the containers of a second of said known handling systems each has a second engaging portion with an elongated fastener receiving opening of a second size which is larger than said first size, said twistlock device comprising a shaft of a size to pass through said first size openings, first locking lug means carried by a projecting end portion of said shaft for rotation with said shaft, said first locking lug means being of a size to pass through said first openings when aligned longitudinally therwith and to lockingly engage said first engaging portion when disposed transversely of said first openings, mounting means mounting said shaft for rotation, second locking lug means of a size larger than said first openings and of a size to pass through said larger second openings when aligned longitudinally therewith and to lockingly engage said second engaging portions when disposed transversely of said second openings, support means mounting said second locking lug means on said shaft for movement axially of said shaft away from a first position adjacent said first locking lug means to a second out of the way position when said twistlock device is engaged with a first engaging portion.

13. The twistlock device of claim 12 wherein said support means and said shaft have cooperating drive means operable when said second locking lug means are in said first position for rotating said second locking lug means.

14. The twistlock device of claim 12 wherein said support means is in the form of a sleeve axially slidable on said shaft and carrying said second locking lug means.

15. The twistlock device of claim 14 together with resilient means urging said sleeve towards said first position, and releaseable locking means on said sleeve and said shaft for locking said sleeve to said shaft for rotation in unison when said sleeve is in said first position.

16. The twist lock device of claim 14 wherein said sleeve is of a transverse dimension greater than said first openings transverse dimension for automatically moving said sleeve towards said second position when said shaft is engaged in one of said first openings.

17. The twistlock device of claim 16 wherein said sleeve has a lower portion of a size to be received in said first opening and a tapered intermediate portion engageable with a first engaging portion for centering said shaft in the first opening thereof.

18. The twistlock device of claim 17 wherein said sleeve is of a size receiveable in said second openings.

19. A load handling device for supporting at least one twistlock device for use in the handling of containers of two known type container handling systems wherein the containers of a first of said known handling systems each has a first engaging portion with an elongated fastener receiving opening of a first size and the containers of a second of said known handling systems each has a second engaging portion with an elongated fastener receiving opening of a second size which is larger than said first size, said twistlock device comprising a shaft of a size to pass through said first size openings, first locking lug means carried by a projecting end portion of said shaft for rotation with said shaft, said first locking lug means being of a size to pass through said first openings when aligned longitudinally therewith and to lockingly engage said first engaging portion when disposed transversely of said first openings, mounting means carried by said frame mounting said shaft for rotation, second locking lug means of a size

larger than said first openings and of a size to pass through said larger second openings when aligned longitudinally therewith and to lockingly engage said second engaging portions when disposed transversely of said second openings, support means axially slidable in said mounting means mounting said second locking lug means on said shaft for movement axially of said shaft away from a first position adjacent said first locking lug means to a second out of the way position when said twistlock device is engaged with a first engaging portion.

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