[0011] Embodiments of the present invention seek to substantially overcome or at least ameliorate one or more of the disadvantages of the prior art, or to at least provide a useful alternative.

Summary of Invention

[0011a] An aspect of the present invention provides a method for supporting and weighing a shipping container, the method including the steps of:

providing a shipping container having a corner casting;

providing a twistlock;

locating the shipping container such that the twistlock is engaged with the corner casting;

locating a lifting device inside the corner casting, the lifting device having a pair of jaws and an actuator;

moving the pair of jaws apart using the actuator from a first position to a second position to lift the shipping container relative to the twistlock,

wherein in the second position the jaws support at least a portion of the weight of the shipping container, and wherein the shipping container remains substantially engaged with the twistlock in the second position;

locating a weighing device between the shipping container and the twistlock; and

moving the pair of jaws from the second position to the first position to apply a force to the weighing device, the weighing device providing an indication of the force applied to the weighing device.

[0011b] Another aspect of the present invention provides a method for supporting and weighing a shipping container, the method including the steps of:

providing a shipping container having a corner casting;

providing a twistlock;

locating the shipping container such that the twistlock is engaged with the corner casting;

locating a lifting and weighing assembly inside the corner casting, the lifting and weighing assembly having a pair of jaws, an actuator and a weighing device, the weighing device providing an indication of a force applied to the lifting and weighing assembly; and

moving the pair of jaws apart using the actuator from a first position to a second position to lift the shipping container relative to the twistlock,

wherein in the second position the jaws support at least a portion of the weight of the shipping container such that the weighing device provides an indication of the portion of the weight of the shipping container being supported by the jaws; and

wherein in the second position the shipping container remains substantially engaged with the twistlock.

[0011c] Another aspect of the present invention provides a container lifting and weighing assembly having:

a lifting device, the lifting device having a pair of jaws and an actuator, said actuator in use moves said jaws from a closed position to an opened positioned to lift a container from a support surface; and

a weighing device, locatable in use between the container to be weighed and the support surface once the lifting device has lifted the container to provide an indication of a weight of the container to be weighed when said jaws move from an opened position to a closed position.

[0011d] Another aspect of the present invention provides a container lifting and weighing assembly having:

a lifting device having a lifting member, the lifting member being a pair of jaws, and an actuator, the actuator being configured to move the lifting member between a first position and a second position, wherein, in the second position, the pair of jaws are further spaced apart than in the first position, the actuator including a double-sided wedge driving the pair of jaws from the first position to the second position to lift a container from a support surface; and

a weight indicator configured to provide an indication of the weight of the container.

Brief Description of Drawings

[0012] A preferred embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawings, wherein:

[0013] Figure 1 shows a lifting device placed in a container corner casting;

[0014] Figure 2 shows the lifting device of Figure 1 adjusting position;

[0015] Figure 3 shows the lifting device of Figure 1 lifting the container upwards;

[0016] Figure 4 shows a weighing device of the present invention being inserted under the container;

[0017] Figures 5a to 5e shows stages of the present invention as shown on a mobile platform;

[0018] Figures 6a to 6c show examples of a screw thread drive and other linear actuators; and

[0019] Figure 7 shows an example of a mini hydraulic cylinder.

[0020] Figure 8 shows an example of a mechanism to transfer load out from beneath the container of Figure 1.

[0021] Figure 9 shows an alternative embodiment of the container lifting and weighing assembly.

[0022] Figure 10 shows two section views of another alternative embodiment of the container lifting and weighing assembly in a first and a second position.

[0030] In the preferred method and as shown in the figures, the lifting device 2 is placed inside a corner casting 20 and rests on the twist lock 32. The lifting device 2 is operated by a user to lift the container upwards and away from the supporting surface 30 by moving the jaws 3, 4 from the first position to the second position as show in Figures 2 and 3. In the second position the jaws 3, 4 are further spaced apart than in the first position, thereby supporting and lifting the container. The container remains engaged (in some form) with the twist lock 32 to prevent sliding off. An adjustment is made to eliminate the gap between the jaws 3, 4 and the corner casting 20. The weighing device 10 is inserted beneath the corner casting 20 and the container is lowered onto the load cell 10. The weight and load distribution may then be recorded.

[0031] In a preferred embodiment, as shown in Figures 10 and 11, the jaw 3 engaging an upper inner surface 21 of the corner casting 20 is formed to extend, when inserted into the corner casting 20, substantially fully into the corner casting 20. This arrangement permits the load transfer from the container to the jaw 3 to occur at the inner corners 22 of the upper inner surface 21 of the corner casting 20, which are less likely to fail under load.

[0032] In instances where a container must be lifted higher, a temporary block may be inserted between the corner casting and the trailer bed. This may at least take the load while the lifting device is adjusted to allow a higher lift through use of a packing piece or a second lifter with a higher lift capacity.

[0033] One part of the method of the present invention includes a lifting system. A system for lifting the container above the bed of the trailer by a small distance allows a weighing device to be placed beneath the container. A system that can work on the widest variety of trailer shapes and designs is provided. The lifting device 2 relies on a twist lock 32 being present or a firm surface on which the container rests. Almost every trailer used to carry containers provides these features. One that does not stress the container or the trailer by large unbalanced loads is also provided. As the container is only lifted about 50 mm, for example to keep in contact with the twist lock 32, bumping the container is unlikely to cause slippage of the load due to the reduced moment arm. A system that ensures the load is always secure from falling and allows a determination of whether a container is dangerously top heavy. This determination is performed by measuring the change in recorded weight by the weighing device 10 as the container is lifted or lowered. Using the known dimensions of the container it is possible to determine whether the centre of gravity is dangerously high.

CLAIMS

1. A method for supporting and weighing a shipping container, the method including the steps of:

providing a shipping container having a corner casting;

providing a twistlock;

locating the shipping container such that the twistlock is engaged with the corner casting;

locating a lifting device inside the corner casting, the lifting device having a pair of jaws and an actuator;

moving the pair of jaws apart using the actuator from a first position to a second position to lift the shipping container relative to the twistlock,

wherein in the second position the jaws support at least a portion of the weight of the shipping container, and wherein the shipping container remains substantially engaged with the twistlock in the second position;

locating a weighing device between the shipping container and the twistlock; and

moving the pair of jaws from the second position to the first position to apply a force to the weighing device, the weighing device providing an indication of the force applied to the weighing device.

2. The method of claim 1, wherein the lifting and weighing devices are provided in a carry bag prior to being located inside the corner casting.

3. A method for supporting and weighing a shipping container, the method including the steps of:

providing a shipping container having a corner casting;

providing a twistlock;

locating the shipping container such that the twistlock is engaged with the corner casting;

locating a lifting and weighing assembly inside the corner casting, the lifting and weighing assembly having a pair of jaws, an actuator and a weighing device, the weighing device providing an indication of a force applied to the lifting and weighing assembly; and

moving the pair of jaws apart using the actuator from a first position to a second position to lift the shipping container relative to the twistlock,

wherein in the second position the jaws support at least a portion of the weight of the shipping container such that the weighing device provides an indication of the portion of the weight of the shipping container being supported by the jaws; and

wherein in the second position the shipping container remains substantially engaged with the twistlock.

4. The method of claim 3, wherein the lifting and weighing assembly is provided in a carry bag prior to being located inside the corner casting.

5. The method of any one of claims 1 to 4, wherein the weighing device includes a load cell.

6. The method of any one of claims 1 to 5, wherein the actuator is hydraulic.

7. The method of any one of claims 1 to 6, further including the step of:

locating a load transfer mechanism in the corner casting, the load transfer mechanism being associated with a second weighing device, wherein the second weighing device is located outside the corner casting.

8. A container lifting and weighing assembly having:

a lifting device, the lifting device having a pair of jaws and an actuator, said actuator in use moves said jaws from a closed position to an opened position to lift a container from a support surface; and

a weighing device, locatable in use between the container to be weighed and the support surface once the lifting device has lifted the container to provide an indication of a weight of the container to be weighed when said jaws move from an opened position to a closed position.

9. A container lifting and weighing assembly according to claim 8, wherein said support surface is part of a twist lock inside a corner casting of said container.

10. A container lifting and weighing assembly according to claim 9, wherein, in combination, the lifting device abuts the support surface and a surface of the corner casting of said container, and the weighing device abuts a second surface of the twist lock and a second surface of the corner casting of the container.

11. A container lifting and weighing assembly according to claim 9 or 10, wherein while the jaws are in the opened position said container remains substantially attached to said twist lock.

12. A container lifting and weighing assembly according to claim 8, wherein said support surface is a ground surface.

13. A container lifting and weighing assembly according to claim 12, wherein said container is lifted no more than about 50 mm from the ground surface during weighing.

14. A container lifting and weighing assembly according to any one of claims 8 to 13, wherein said weighing device includes a load cell.

15. A container lifting and weighing assembly according to any one of claims 8 to 14, wherein said actuator is hydraulic.

16. A container lifting and weighing assembly according to any one of claims 8 to 15, wherein said assembly is portable and includes a carry bag to transport said lifting device and weighing device.

17. A container lifting and weighing assembly according to claim 16, wherein said assembly includes four lifting and weighing devices in each carry bag.

18. A container lifting and weighing assembly according to any one of claims 8 to 17, wherein said assembly includes a plurality of weighing devices.

19. A container lifting and weighing assembly according to any one of claims 8 to 18, wherein said assembly includes a load transfer mechanism associated with a second

weighing device positioned offset from a line of support when said jaws are lifting said container.

20. A container lifting and weighing assembly having:

a lifting device having a lifting member, the lifting member being a pair of jaws, and an actuator, the actuator being configured to move the lifting member between a first position and a second position, wherein, in the second position, the pair of jaws are further spaced apart than in the first position, the actuator including a double-sided wedge driving the pair of jaws from the first position to the second position to lift a container from a support surface; and

a weight indicator configured to provide an indication of the weight of the container.

21. The container lifting and weighing assembly of claim 20, wherein the weight indicator is a weighing device locatable, in use, between the container and the support surface when the container is lifted, the weighing device providing an indication of the force applied to the weighing device when the lifting member moves from the second position to the first position.

22. A container lifting and weighing assembly according to claim 21, wherein the container lifting and weighing assembly includes a load transfer mechanism configured to locate the weighing device positioned offset from a line of support between the container and the support surface.

23. A container lifting and weighing assembly according to claim 21 or 22, wherein the weighing device includes a load cell.

24. A container lifting and weighing assembly according to any one of claims 21 to 23, wherein the container lifting and weighing assembly includes a plurality of weighing devices.

25. A container lifting and weighing assembly according to any one of claims 20 to 24, wherein, in combination, the lifting device abuts the support surface and a surface of

the corner casting of the container, and the weighing device abuts a second surface of a twist lock and a second surface of the corner casting of the container.

26. A container lifting and weighing assembly of claim 20, wherein the weight indicator is a component of the actuator.

27. A container lifting and weighing assembly of claim 26, wherein the weight indicator provides an indication of the force applied to the lifting member in the second position.

28. A container lifting and weighing assembly according to any one of claims 20 to 27, wherein the support surface is part of a twist lock inside a corner casting of the container.

29. A container lifting and weighing assembly according to claim 28, wherein, while the lifting member is in the second position the container remains substantially attached to the twist lock.

30. A container lifting and weighing assembly according to any one of claims 20 to 27, wherein the support surface is a ground surface.

31. A container lifting and weighing assembly according to claim 30, wherein the container is lifted no more than about 50 mm from the ground surface during weighing.

32. A container lifting and weighing assembly according to any one of claims 20 to 31, wherein the actuator is hydraulic.

33. A container lifting and weighing assembly according to any one of claims 20 to 32, wherein the container lifting and weighing assembly is portable.

34. A container lifting and weighing assembly according claim 33, wherein the container lifting and weighing assembly includes a carry bag.

35. A container lifting and weighing assembly according to claim 34, wherein the container lifting and weighing assembly includes four lifting devices in each carry bag.