

A LOCKING ASSEMBLY

Field

[0001] The present invention relates to a locking assembly and in particular to a locking assembly for shipping containers to assist with container loading, unloading and transporting. Also discussed are the processes and equipment used to move containers using that locking assembly.

Background

[0002] Containers are used throughout the world to transport and store material. Large containers such as shipping containers are typically transported through a port and moved over land by trucks or rail. Most containers contain a generally rectangular housing (ISO corner casting) on each corner of the container. Those housings generally have a hole in each side wall and the bottom or top walls. That is, a hole in each surface facing away from the container. Generally, the holes in the side walls can support about 300 kN whilst the bottom or top hole can only support about 150 kN. Typically, when containers are transported, they are transported by connecting to the bottom or top holes and accordingly are connected via the weakest holes.

[0003] Lifting two or more containers at the same time is known as a Vertical Tandem Lift. It was restricted to a maximum weight of 20 tonnes and for containers on the deck of a ship only. In practice, it was further restricted to two or sometimes three empty containers or two very lightly loaded containers. The problem with such a lift was that the holes allocated for lifting are only rated to 150 kN and in combination with concerns about the ability to ensure that all corners of a container are attached securely, the load in practice was limited to 75 kN in some jurisdictions.

[0004] Use of a Vertical Tandem Lift to lift multiple containers has only had small application to date being used in only about 1-2% of lifts worldwide. It cannot practically be used below decks in a cellular design ship or those with on-deck container guides as there is a danger that if conditions at the receiving end do not meet those planned for (e.g. availability of large cranes, change of port, high winds, breakdown of other machinery.....) the Vertical Tandem Lift arrangement cannot be reconfigured and potentially the ship could be forced to

abandon the loading and/or unloading. Reconfiguration of the locking arrangement is near impossible as the guides completely cover the corner fittings blocking access and even if they could be undone there is no opportunity to insert another lock into the guides.

[0005] Also, the current fittings generally have either a wire or a handle for operating the fitting. This wire/handle protrudes beyond the edge of the container thus risking damage to the handle/wire or jamming of the container in the guides below deck.

[0006] Further, there is a constraint on multiple lifting as the strength of the joint between the connectors and the corner housings of a container can not be verified that all connectors are engaged with the container leading to the application of an extra safety factor of 2 on top of other safety factors reducing the allowable total load to well below 20 Tonnes which is not economically sustainable.

[0007] Standard inter-container connectors are also virtually impossible to individually identify and there are widespread doubts about the adequacy of maintenance arrangements. It appears that the standard maintenance regime is "fix on fail" which is not normally acceptable in a lifting device and can result in worker injuries and deaths. Further, current inter-container connectors are not designed for lifting (only locking two containers together on a ship) and this limits their ability and desirability to be used for multiple container lifts.

[0008] Studies of the mode of failure of fittings into containers show that the strength of the fitting/container joint is often limited by the ability of the container corner to withstand the very high localized loads especially at the edge of the engagement hole. This in combination with already high loads caused by restricted area of interface between the container and the fitting leads to the fitting punching through the container corner and the connection is broken. Even when this failure mode is not present the joint strength is restricted by the structural strength of the fitting which is often compromised by its inability to compensate for situations such as non parallel faces in the corner casting and/or the fitting.

[0009] Even when a means of successfully joining containers together into a vertical stack is devised there still remains the problem of breaking them down to individual units at some point in the transport chain.

[0010] There also remains the potential issue when lifting multiple containers that the stack may experience a phenomenon known as “helicoptering” which makes accurate and safe positioning of containers difficult.

[0011] Accordingly, there is a need to devise a way in which the full capacity of the container can be used for lifting. The end (and/or side) holes could be used to take some of the load but also designed so that the container can be handled in standard ways and lashed above a ship’s deck in a safe manner. There is also a need to eliminate the uncertainties as to whether the fitting is properly engaged with the container.

Object of Invention

[0012] It is an object of the present invention 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

[0013] There is firstly disclosed herein a locking assembly having:

- a base;
- a pair of arms extending longitudinally away from said base in opposing directions;
- each said arm having a proximal end engageable with said base and a distal end remote said base;
- said distal end of said arm having a locking means movable relative to said base and adapted to engage a recess of an object to lock said object to said assembly.

[0014] Preferably, said base is generally rectangular in shape and defines a longitudinally extending base axis.

[0015] Preferably, said arms define a longitudinally extending arm axis which is generally perpendicular to said base axis.

[0016] Preferably, said locking means is rotatable about said arm axis.

[0017] Preferably, said locking means is moveable parallel to said base axis.

[0018] Preferably, said locking means includes a tab member to be located in use in said recess of said object to lock said object to said assembly.

[0019] Preferably, said object is a shipping container.

[0020] Preferably, said container includes one or more recesses located at one or more corners of said container.

[0021] Preferably, said tab member in use locks into a recess located parallel to a side or end wall of said container.

[0022] Preferably, said tab member slides along a plane approximately parallel to said base axis to engage a recess of said container.

[0023] Preferably, said locking assembly includes means to move said locking means relative to said base.

[0024] Preferably, said moving means is an actuator.

[0025] Preferably, said actuator is operatively associated with said base.

[0026] Preferably, the arms are integrally formed.

[0027] Preferably, said locking means includes a spring or other means to engage said locking means upon insertion into a recess of an object.

[0028] Preferably, the arms move with the locking means relative to said base.

[0029] Preferably, said locking assembly includes means of locking the arms into the container so that the locking position cannot be attained unless the locking assembly is properly engaged to the container.

[0030] Preferably, said locking assembly is adapted to connect two containers together by engagement of the locking means within corresponding recesses of said containers.

[0031] Preferably, said locking assembly further includes electronic, mechanical or other means operatively associated with said assembly to confirm engagement of said locking means within said recess(es) of an object.

[0032] Preferably, said locking assembly further includes means by which a total interface pressure on the corner of the container is reduced.

[0033] Preferably, the contact area is larger than a conventional fitting.

[0034] Preferably, said locking assembly further includes means by which localized stresses at the interface of the locking assembly and the corner casting are reduced.

[0035] Preferably, a soft washer element is used between the hook and the corner to reduce to localised stresses - the washer deforms to prevent the corner being punched through.

[0036] Preferably, the locking assembly includes a means of mechanically operating the fitting without requiring an external wire or handle on the fitting.

[0037] Preferably, the locking assembly includes a means of connection between the fitting the actuator that is quick and reliable.

[0038] Preferably, the locking assembly includes a means of actuating the fitting by which the fitting provides "feedback" to the actuating system and the operator of its current status and in particular whether it has successfully locked or unlocked.

[0039] Preferably, the locking assembly includes an electronic and/or mechanical interlock such that the container lifting means (spreader) cannot be lifted unless all four fitting have successfully locked/unlocked and the fittings (if present) below are unlocked.

[0040] Preferably, the interlock eliminates the need to reduce the load factor by 50%.

[0041] Preferably, the locking assembly includes an external actuator that can operate the fittings when they are in stacks beyond the reach of operators.

[0042] Preferably, the locking assembly allows containers to be locked and unlocked at will on the ship or in the yard.

[0043] Preferably, the locking assembly includes a form of stabilization to the spreader and/or containers to reduce their tendency to "helicopter".

[0044] Preferably, the locking assembly includes an actuator that can positively lock the fitting in the lock or unlock position but also provides a means by which the fitting can automatically attach to a container by use of a spring.

[0045] Preferably, the locking assembly includes a means by which the fittings can be remotely identified and thus their operational and maintenance status is known.

Brief Description of Drawings

[0046] A preferred embodiment of the present invention will now be described, by way of an example only, with reference to the accompanying drawings wherein:

[0047] Figure 1 is a schematic view of the locking assembly of the present invention in a retracted configuration;

[0048] Figure 2 is the locking assembly of Figure 1 in an expanded configuration;

[0049] Figure 3 is a front view of the locking assembly of Figure 1;

[0050] Figure 4 is a rear view of the locking assembly of Figure 1;

[0051] Figure 5 is a perspective view of the locking assembly of Figure 1;

[0052] Figure 6 is a side view of the locking assembly of Figure 1;

[0053] Figure 7 is a plan view of the locking assembly of Figure 1;

[0054] Figure 8 is a side view of the locking assembly of Figure 1;

[0055] Figure 9 is an alternate embodiment of the locking assembly of the present invention;

[0056] Figure 10 is an alternate embodiment of the locking assembly of the locking assembly of the present invention;

[0057] Figures 11a, 11b and 11c show the locking assembly of the present invention with the locking means rotating and moving;

[0058] Figures 12a, 12b and 12c show the locking assembly of the present invention with the locking means rotating and moving;

[0059] Figure 13 is an example of loading a ship with multiple containers utilising the locking device of the present invention;

[0060] Figure 14 is an example of loading a ship with multiple containers utilising the locking device of the present invention; and

[0061] Figures 15a to 15e shows an example of the locking means of the present invention in use;

[0062] Figures 16a to 16e shows an example of the locking means of the present invention in use;

[0063] Figure 17 shows a partially sectioned perspective view of an alternative embodiment of the present invention.

Description of Embodiments

[0064] There is schematically depicted herein and as best shown in Figures 1 to 10 and 17 a locking assembly 1 having a base 2, a pair of arms 4 extending longitudinally away from the base 2 in opposing directions. Each of the arms 4 have a proximal end 5 engageable with the base 2 and distal ends 6 remote the base 2. The arms 4 are usually joined to each other and effectively pass through the base 2 without transmitting any force to it. The distal ends 6 of the arms 4 have a locking means or locking head 10 movable relative to the base 2 and adapted to engage a recess 20 of an object 22 to lock the object 22 to the assembly 1. In the preferred form the base 2 is generally rectangular in shape and defines a longitudinally extending base axis or plane AA. Similarly, the arms 4 define longitudinally extending arm

axes BB which are generally perpendicular to the base axis AA. The locking means 10 is typically rotatable about the arm axis BB and may also move parallel to the base axis AA so that the locking means 10 can be positioned to engage with recesses 20 of an object such as a container 21 or the like. The locking means 10 includes a tab member 30 to be located in use in the recess 20 of the container 21 to lock the container 21 to the assembly 1. Shipping containers 21 typically include one or more recesses 20 located at one or more corner housings 50 of the container 21 as best seen in Figure 12. The recesses 20 on the sides and ends of the housings 50 are able to carry more weight than the recesses on the bottom facing away from the container 21. The tab member 30 locks into the recess 20 preferably parallel to a side or end wall of the container 21. The tab member 30 can slide along a plane parallel to the base axis AA to engage each recess 20 of the container 21. The assembly 1 further includes means 40 to move the locking means 10 relative to the base 2. In a preferred form, the moving means 40 includes an actuator 40 (as best seen in Figures 15a to 15e, 16a to 16e and 17) which is preferably operatively associated with the base 2. However, it should be noted that any typical type of actuator 40 or moving means could be utilised. In the preferred form, and as best seen in Figures 9 and 10, the arms 4 are integrally formed together and move with the locking means 10 relative to the base 2. Utilising the present invention, the locking assembly 1 is adapted to connect two containers 21 together by engagement of the locking means 10 within corresponding recesses 20 of the containers 21. In a variant, and as best seen in Figure 10, latching element 61 may be included to transmit load between the containers.

[0065] The base 2 houses the shaft or arms 4 and the actuator assembly 40. It also resists shear forces and compressive forces between the adjacent containers 21. In addition the base 2 is shaped to facilitate operation of the actuation mechanism by allowing the actuator 40 to be attached to the base 2, reducing the forces applied to the actuator during operation.

[0066] The actuator 40 is designed to transmit force from an external source (manual or machine) to twist the head 30 for insertion or removal and where required to translate the arms 4 along the base 2 to engage the heads 30 with the end /side holes 20. In cases where containers 21 are being unloaded in windy conditions the invention makes use of a stabilizer (e.g. a gyroscope) arrangement for preventing or reducing swing.

[0067] The assembly 1 therefore includes a load bearing assembly consisting of two locking heads 10 attached to a shaft or arms 4. This assembly 1 is engaged with the container corner housings 50 to transmit force between them. This force may be resultant from the movement of the vehicle to which the containers 21 are loaded or could be a force resulting from lifting one or more containers 21 with another container 21. The assembly 1 is able to rotate and translate within the corner housing 50 of an existing container 21 to engage the end (or side) holes 20. The locking heads 10 are designed to move and spread the applied load and to balance the forces on the shaft or arms 4 to prevent excessive bending moments.

[0068] The assembly 1 allows a much greater load to be taken on the corner fitting housing 50 than existing devices and as such greatly expands the ability to lift multiple containers 21 simultaneously. The assembly 1 also allows use below deck, above deck and works with full and/or empty containers 21.

[0069] The assembly 1 can also be operated by automated machinery or manually. A family of actuating devices 40 could be included. The core actuator 40 can be applied in a number of different configurations based on application. Of these there are two main types; machines that can reconfigure a stack of containers 21 which already have the assembly 1 fittings inserted and those that also insert or remove the assembly 1. These machines (not shown) are designed to move the assembly 1 of multiple containers 21 away from a transport area.

[0070] The assembly 1 can include "smart tag" or similar identification technology to track use of the assembly 1 and their loading history to facilitate proper maintenance.

[0071] The ability to carry multiple containers safely in a "Safe Loading Unit" (SLU - not shown) - requires minor modifications to allow it to carry SLUs but increases throughput per machine. Examples of this include: A shipboard unlash platform that allows rapid lash/unlash and removes workers from potentially unpleasant and dangerous working sites. A larger "bombcart" which is lower and is wider able to carry one or more SLUs. Addition of simple load restraints to straddles to stabilise the load when carrying an SLU. An alternative spreader design (a standard spreader but using the assembly 1 that can safely lift a greater load). A significantly modified Automated Guided Vehicle (AGV - not shown) which is able to carry SLUs and a further modification which allows disconnection of the crane/AGV cycles to reduce the amount of capital required. Simple storage racks to allow SLUs with the

assembly 1 to rest on the pavement without a machine present either during an exchange sequence or while an SLU is being assembled or torn down.

[0072] The assembly 1 makes use of the untapped capability in the corner fitting housing 50 to greatly increase the load capability of the assembly 1. This is done in two main ways: The contact area is greater than a standard lock increasing the threshold load at which the lock 10 pulls through the bottom/top of the corner fitting housing 50 and fails. The assembly 1 engages one or more of the side holes 20 of the ISO fitting housing 50 which are rated at double the load of the bottom/top hole. Alternatively, in another embodiment, the locking assembly 1 can rely on using the full capacity of the corner fitting 50.

[0073] As mentioned, the high-load holes 20 are reserved for use by other lashing equipment. To overcome this the assembly 1 is designed to retract out of the reserved area when not required for creating Safe Lifting Units i.e.: its use of the hole 20 is legitimate during a multi-container lift but when other lashing (such as on-deck) is required the head 30 is moved out of the way and is fully compliant. By removing this constraint the assembly 1 allows operators to optimise the loading of their cranes and will also open up the possibility of larger capacity cranes in the future. As mentioned above in an alternative embodiment, the locking assembly 1 can rely on using the full capacity of the corner fitting 50.

[0074] The assembly 1 has also been designed to allow rapid reconfiguration in-situ and thus a ship may be loaded in (say) SLUs of 4 at origin and unloaded at a port in single containers 21. The actual size of an SLU will vary according to the weight distribution of the constituent containers 21, the capability of the cranes, the capability of the dock equipment and the future destination of the container 21 (e.g.: will the SLU be transhipped, placed in a two-up arrangement on a train etc), weather conditions etc.

[0075] The assembly 1 also allows below deck reconfiguration. The assembly 1 can be operated "between the guides" from the end of the container 21 or from the side so that the guides do not block access. As the entire load will be fitted with assemblies 1 there is no need to insert extra fittings to the stack.

[0076] The assembly 1 has been designed along with its actuating machine. The actuator 40 is small and light so that it can be fitted between stacks of containers 21 on a ship (including 20 foot containers stored in 40 foot cells). This allows 20 foot containers to be properly

constrained below decks and removes a small but significant stacking height limitation above and below deck. Doing this will increase load flexibility of the ship and in some cases will increase the total potential load of the ship.

[0077] In a preferred form, the actuator 40 is a simple linear drive with discrete stopping positions as best seen in Figures 15a-15e.. An actuator 40 can access the assembly 1 from either end of the base 2 so providing greater operational flexibility and especially the ability to operate on containers 21 stored in guides or between stacks of 20 foot containers 21.

[0078] Figures 11a-11c, 12a-12c and 16a-16l show the way in which the heads or locking means 30, via the shaft or arms 4 can rotate using the interaction of the linearly constrained actuator 40 and the guiding arms 60 which support the heads 70.

[0079] Use of a lashing platform together with the assembly 1 above deck will greatly speed up the process of unlashings by reducing the number of assembly 1 to be undone. Only 4 assemblies 1 per SLU requires undoing. By providing automated or semi-automated external actuators (not shown) a lashing platform can allow up to 6 stacks to be unlashed simultaneously.

[0080] There is also an opportunity to deploy the unmanned actuators 40 onto stacks without lashing bars. Although the quay crane will be required to relocate the equipment to new stack this will greatly reduce lead time and "non revenue" moves and will reduce overall time in port due to lashing activities.

[0081] A further advantage is that by using the lashing platform the potential for longer lashing bars is opened up. This would further reduce load restrictions of the ship and potentially increase load flexibility and potentially total load.

[0082] The assembly 1 and the actuators 40 (external drive actuators) will be fitted with "Smart tag" or similar technology. This will enable tracking of the operating life and service history of the assemblies 1 which in turn will ensure that time-based or condition-based maintenance is undertaken when due and overcomes common concerns about the state of twistlocks in service.

[0083] A De-reconfigurator (not shown) could also be used the same as an actuator 40 but with the added ability to lift and separate two containers 21 in a stack, insert or move the assembly 1. This allows preparation of SLU to be cheaply automated and also removed from the congestion of the crane (not shown) with which in turns keeps the crane operating at full capacity and ensures that the feed vehicles (straddles, bombcarts etc) are able to keep up. The De-reconfigurator is either placed on top the stack or positions itself (mobile version) above the stack of containers 21. The loading order on the ship has already been set in the stack order. The unit drops down both sides of the stack and engages each pair of containers through their corner castings. Small hydraulic jacks (not shown) lift the upper container 21 allowing a simple indexing mechanism to insert the assembly 1 into the upper container 21. The upper container 21 is then lowered and the assembly 1 automatically engages the corner casting 50. The actuator 40 then pushes the assembly 1 to the locked position. The assembly 1 disengages and indexes down to the next container 21 join. Dismantling is a reverse of this process. Accordingly, the assembly 1 allows loading and unloading from purpose built cartridges allowing a machine to safely handle large numbers of fittings without human intervention. Alternatively, there is another version which simply unlocks containers 21 in a stack, leaving the assemblies 1 in the bottom of each container 21. The assemblies 1 are removed later in the process - either near the truck gate or at a further destination with the assemblies 1 being used to attach the container 21 to the vehicle without need for the driver to get out.

[0084] Figures 15a to 15e and 16a to 16l show an example of how the actuators 40 of the assemblies 1 delivers four states of operation. The actual physical arrangement of the components can vary, for example, a clutch may be added to prevent over tightening.

[0085] At I1, it can be seen that the nut 200 has reached the end cap 202 (position E) and can move no further. It could stand off and remain spring loaded if required. This moves the arms on the shaft 206 to the maximum travel and the heads 10 to the I1 position (see Figures 16a to 16l).

[0086] At the I1 position the upper head 10 is aligned with the long side of the corner casting hole. In this position the fitting may be withdrawn from the upper container 21. In the preferred method this position can be obtained by either applying external force to the heads 108 or by operating the actuator 40 to this position and thus locking it in place. While in this

position the lower head is at a slight angle (15 degrees) to the long axis of the hole thus locking the assembly 1 into the lower container 21. In other forms it could be about 12 to 20 degrees.

[0087] At I2 nut 200 has been moved to position D. The bracket 210 (and hence shaft 206) can be moved further by either using the actuator 40 to take the nut 200 to position E or by applying an external force to the heads 10 to turn them against the spring 212 to attain the I1 position.

[0088] At I2, the position is where the lower head 10 is aligned with the long side of the corner casting hole. In this position the assembly 1 may be withdrawn from the lower container 21. In the preferred method this position can be obtained by either applying external force to the heads 10 or by operating the actuator 40 to this position and thus either locking it in place or holding it in place against the spring 212 (depending on version). While in this position the upper head 10 is at 15 degrees to the long axis of the hole thus locking the assembly 1 into the upper container 21. Placing a container 21 onto the assembly 1 at this position will allow it to automatically connect to the container 21 - this is useful for automatic insertion of the assembly 1.

[0089] At TL, two positions are shown under this mode. In both the nut 200 is at position C. In the upper diagram the assembly 1 is at rest with no external force applied to twist the heads 10. This equates to the head 10 having been inserted into a corner casting 50 as happens onboard ship. In the lower position it can be seen that an external force (either via the heads 10 or a direct external push onto the bracket 210) to move the bracket 210 against the spring 212 to the same location as I2. The difference is that when the external force is removed the bracket 210 will return to the rest position.

[0090] At TL, or twistlock position, this position turns the heads 10 to a position whereby they are able to withstand lashing loads (as on a ship). This position is also configured to allow the heads 10 to move and spring 212 back when a container 21 is pushed onto the assembly 1 from above or below. This position is an analogy of a conventional twistlock. The purpose of doing this is to allow conventional loading of a ship (one at a time) without requiring the assembly 1 to be moved to the SafelokTM position (SL).

[0091] At SL, Safelok™ position, the upper diagram shows the arrangement at the point that the bracket 210 (and hence heads 10) attain the alignment of the Safelok™ position but only the spring 212 is holding the head 10 in this position. The nut 200 is at position A.

[0092] In the lower diagram the nut 200 is now at position B. In this position there is little or no movement possible as the bracket 210 has been forced to hit a physical stop (represented as triangle). The heads 10 cannot be moved without moving the actuator 40.

[0093] At SL: Safelok™ position, the heads 10 are moved further around. Here the two heads 10 are placed slightly each side of 90 degrees - this is the strongest position in terms of loading the assembly 1. In this position the actuator 40 is locked into place and cannot be moved unless a deliberate action is taken to move the actuator 40. At this position the assembly is fail safe - failure of the spring 212 or mechanism will leave the assembly 1 in the safe position.

[0094] Advantageously, in an embodiment, the locking assembly is constructed so as to transfer its load to the recess of the container via a surface that is relatively compliant/resilient. Deformation of the surface prevents excessive local loading from allowing the fitting to punch through the corner casting or to locally overload the tab member.

[0095] Further, there is provided a means of providing an electronic or mechanical interlock between fitting such that a lift will not occur until the four fittings to take the load are all correctly engaged and verified as being in the Safelok™ position and that the four fittings (if present) below are properly engaged or disengaged.

[0096] Although the invention has been described with reference to specific examples, it will be appreciated by those skilled in the art that the invention may be embodied in many other forms.

CLAIMS

1. A locking assembly having:
 - a base;
 - a pair of arms extending longitudinally away from said base in opposing directions;
 - each said arm having a proximal end engageable with said base and a distal end remote said base;
 - said distal end of said arm having a locking means movable relative to said base and adapted to engage a recess of an object to lock said object to said assembly.
2. The locking assembly of claim 1, wherein said base is generally rectangular in shape and defines a longitudinally extending base axis.
3. The locking assembly of claim 2, wherein said arms define a longitudinally extending arm axis which is generally perpendicular to said base axis.
4. The locking assembly of claim 3, wherein said locking means is rotatable about said arm axis.
5. The locking assembly of claim 3, wherein said locking means is moveable parallel to said base axis.
6. The locking assembly of claim 1, wherein said locking means includes a tab member to be located in use in said recess of said object to lock said object to said assembly.
7. The locking assembly of claim 6, wherein said object is a shipping container.
8. The locking assembly of claim 7, wherein said container includes one or more recesses located at one or more corners of said container.
9. The locking assembly of claim 8, wherein said tab member locks into a recess located parallel to a side or end wall of said container.
10. The locking assembly of claim 8, wherein said tab member slides along a plane approximately parallel to said base axis to engage a recess of said container.

11. The locking assembly of claim 1, wherein said moving means is an actuator.
12. The locking assembly of claim 11, wherein said actuator is operatively associated with said base.
13. The locking assembly of claim 1, wherein the arms are integrally formed and movable together.
14. The locking assembly of claim 1, wherein said locking means includes a spring to engage said locking means upon insertion into a recess of an object.
15. The locking assembly of claim 1, wherein the arms move with the locking means relative to said base.
16. The locking assembly of claim 1, including means adapted to lock the arms into the object so that a locking position cannot be attained unless the locking assembly is properly engaged to the object.
17. The locking assembly of claim 1, wherein the locking assembly is adapted to connect two objects together by engagement of the locking means within corresponding recesses of said objects.
18. The locking assembly of claim 1, including an actuator adapted to positively lock the assembly in a lock or unlock position and also provide a means by which the assembly is adapted to permit automatic attachment to and from an object.
19. The locking assembly of claim 1, including means by which the assembly can be remotely identified.