CONTAINER LOCKING SYSTEMS

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Appl. No.: 11/982,710

Filed: Oct. 31, 2007

Publication Classification

Int. Cl. B65D 55/14 (2006.01)

U.S. Cl. ........................................... 70/158

ABSTRACT

A system for locking a container door to a container body is provided. The system includes a rotating member coupled to the door. The system further includes a cover covering the rotating member and an opening formed through the cover. The system also includes a handle coupled to the rotating member and extending through the opening, the handle being moveable through the opening for rotating the rotating member between a locked and an unlocked position. Moreover the system includes a lock for preventing rotation of the rotating member to the unlocked position.
CONTAINER LOCKING SYSTEMS

BACKGROUND OF THE INVENTION

[0001] This invention relates to a locking system for containers such as shipping containers. Containers such as shipping containers typically include two barn style doors 12 formed on one of their ends which allow for ingress into and the egress out of the container. One of the doors may include a stopper plate 14 extending there from such that when the two doors are closed, the stopper plate prevents the other door from opening relative to the door incorporating the stopper plate.

[0002] To lock the doors in the closed position, vertically extending rods 16 are mounted on the doors via rod brackets 17 which allow the rods to rotate about a vertical axis relative to the doors. The rods extend above and below the doors and engage lock members 18 formed on the upper edge 20 and the lower edge 22 of the container body which define the container perimeter. When the rods are turned into a locked position, the rod ends engage and interlock with the lock members. This type of locking arrangement is well-known in the art.

[0003] A handle 24 is coupled to each rod. Typically, a bracket 26 is welded onto the rod 16 and the handle is pivotally coupled to the bracket so that it can pivot about an axis generally perpendicular to the longitudinal axis of the rod. The handle is used to rotate the rod about its vertical central longitudinal axis from a locked position to an unlocked position. When in the locked position, the handle is generally parallel to the door. Typically when in the locked position, the handle is in a relatively horizontal position and is received and rests into a lock bracket 28 attached to the door. A lock may then be coupled to the bracket to prevent the handle from pivoting upwards and disengaging from the lock bracket. In this regard, the handle and the rod are retained in the locked position. To unlock the door, the lock is removed from the lock bracket, the handle is pivotally raised so as to allow for the rotation of the rod about its central longitudinal axis to unlock from the lock members 18 on the perimetral upper and lower edges of the container. As shown in FIG. 1, more than one locking rod may be incorporated on each door.

[0004] A disadvantage with such locking systems is that the rod and the handle are exposed allowing for a thief to cut the rod or the handle so as to allow him/her to rotate the rod and unlock the doors. Consequently, a more robust locking system is desired that would make it more difficult to compromise the locking integrity of the container doors.

SUMMARY OF THE INVENTION

[0005] In an exemplary embodiment a lock system for locking a container door to a perimetral portion of a container is provided. The system includes a rotating member coupled to the door and interacing with a member extending from a body, e.g., a perimetral portion, of the container, wherein rotation of the rotating member about a longitudinal axis in a first direction causes the rotating member to rotate to a first position to lock with the member, and rotation about a second direction opposite the first direction causes the rotating member to rotate to a second position to unlock from the member. The system also includes a cover extending over a majority of the rotating member, and an opening formed through the cover. A handle is coupled to the rotating member and extends through the opening. The handle is moveable through the opening for rotating said rotating member in the first and second directions. The system further includes a lock locking onto the handle. The lock includes a surface for interfacing with the opening and preventing movement of the handle in a direction for preventing rotation of the rotating member to the second position. In one exemplary embodiment, the cover extends over the rotating member and the member extending from the body of the container. In another exemplary embodiment, the opening is bounded at least in part by an opening wall extending generally perpendicular in relation to the rotating member for being engaged by said lock surface, whereby the lock surface interfaces with said opening for preventing rotation of the rotating member to the second position. The opening wall in an exemplary embodiment defines a generally circular section, the lock is generally circular and the lock surface is a peripheral surface of the lock. In yet another exemplary embodiment, the system includes a bar extending from the handle, wherein the lock locks on the bar. In yet another exemplary embodiment, the handle also includes a first handle portion coupled to the rotating member, a bracket coupled to the first handle portion and extending outside of the cover during operation of the handle, and a handle arm coupled the bracket. In another exemplary embodiment, the handle includes a weaker section relative to the other sections of the handle. The weaker section is located outside the cover and is designed to break prior to the other sections when exposed to a force. In yet a further exemplary embodiment, the cover includes two parallel walls extending from the door and a transverse wall there between defining the box like structure with the door. In a further exemplary embodiment, the cover is a box structure comprising four walls. In another exemplary embodiment, the cover in combination with the door and said perimetral portion of the container encapsulates the rotating member and the member extending from the body of the container when said door is in a closed position.

[0006] In further exemplary embodiment, a system for locking a container door to a body of a container is provided. With this exemplary embodiment the system includes a rotating member coupled to the door for interfacing with a member extending from a body of the container, wherein rotation of the rotating member about a longitudinal axis in a first direction causes the rotating member to rotate to a first position for locking with the member, and rotation about a second direction opposite the first direction causes the rotating member to rotate to a second position for unlocking from the member. The system further includes a cover extending over a majority of the rotating member and an opening formed through the cover. The system also includes a handle coupled to the rotating member and extending through the opening, said handle being moveable through the opening for rotating said rotating member in the first and second directions. In yet another exemplary embodiment this system also includes a lock for preventing rotation of the rotating member to the second position. In one exemplary embodiment, the lock interfaces with the cover for preventing rotation of the rotating member to the second position. In an exemplary embodiment, the opening is bounded at least in part by a peripheral wall and the lock engages this peripheral wall for interfacing with the cover for preventing rotation of the rotating member to the second position. In one exemplary embodiment, the cover extends the rotating member and the member extending from the body of the container. In yet another exemplary embodiment, the handle also includes a first handle portion
coupled to the rotating member, a bracket coupled to the first handle portion and extending outside of the cover during operation of the handle, and a handle arm coupled the bracket. In another exemplary embodiment, the handle includes a weaker section relative to other sections and located outside the cover. The weaker section is designed to break prior to the other sections when exposed to a force. In yet a further exemplary embodiment, the cover includes two parallel walls extending from the door and a transverse wall there between defining a box like structure with the door.

[0007] In another exemplary embodiment the system includes a bar mounted on the door such that the lock engages the bar for preventing rotation of the rotating member to the second position. With this exemplary embodiment, the lock may or may not engage the cover when attempting to rotate the rotating member to be rotated to the second position. The handle may include an opening penetrated by the bar mounted on the door when the rotating rod is in the first position. In another exemplary embodiment, the lock is generally circular in plan view and the opening formed through the cover includes a circular portion such that the lock is concentric with and occupies the opening circular portion.

[0008] In other aforementioned exemplary embodiments, the cover extends along the entire length of the rotating member. In further exemplary embodiments, the cover has sufficient dimensions to encapsulate the rotating member and the member extending from the perimetral portion of the container. In another exemplary embodiment, a cap is provided over the end of the cover proximate the member extending from the perimetral portion of the container where the door of the container on which the cover is mounted is closed.

**BRIEF DESCRIPTION OF THE DRAWINGS**

[0009] FIG. 1 is an end view of a container incorporating prior art locking systems.
[0010] FIG. 2 is an end view of a container incorporating a locking system of the present invention.
[0011] FIG. 3 is a perspective view of a box cover incorporated in a locking system of the present invention.
[0012] FIG. 4 is a partial plan view of the box cover shown in FIG. 3, including an opening accommodating a lock handle.
[0013] FIG. 5 is a partial perspective view depicting a portion of a handle incorporated in an exemplary embodiment system of the present invention in an open position.
[0014] FIG. 6 is a bottom view of a lock used in an exemplary embodiment system of the present invention.
[0015] FIG. 7 is a perspective view showing a lock in a locked position incorporated in the locking system of the present invention.
[0016] FIG. 8A is a partial top view of an exemplary embodiment locking system of the present invention.
[0017] FIG. 8B is a partial plan view of the exemplary embodiment locking system shown in FIG. 8A.
[0018] FIG. 9 is a partial plan view of an another exemplary embodiment locking system of the present invention.

**DETAILED DESCRIPTION OF THE INVENTION**

[0019] In an exemplary embodiment, a locking system 30 is provided which includes a cover, as for example, a box cover 32 surrounding a locking rod or rotating member 16, as well as the lock members 18 extending from on the perimetral upper edges 20 and lower edges 22 of the container body when the doors 12 are in a closed position, as for example shown in FIG. 2. In an exemplary embodiment, the cover forms a channel with two parallel sides 34 edges extending relatively perpendicular from the door 12 and a transverse side 36 coupling the two transverse sides. The cover is tall enough to house the entire rod as well as the lock members 18 formed on the upper and lower transversal edges of the container. In an exemplary embodiment, the sides 34 are welded to a container door so that the box encapsulates the rod and lock members.

[0020] In another exemplary embodiment, the cover is rectangular or square in cross-sections such that it surrounds the rod portion along the door and includes a fourth side 38 generally parallel to transverse side 36, as shown in FIG. 3. The fourth side, if incorporated is mated to the door 12. With this exemplary embodiment, i.e., when a four-sided cover is used, the rod brackets 17 that mount the locking rod to the door are fastened onto the cover which is fastened, welded or otherwise attached to the door itself. Furthermore, with this exemplary embodiment, the fourth side of the cover which is mounted against the door and it does not extend to the perimetral upper and lower edges of the container. The other three sides of the cover are able to cover the lock members which are engaged by the rod on the perimetral upper and lower edges of the container. With either of the aforementioned exemplary embodiments, the cover ends may be covered with end plates or caps 40 to completely encase the rods. In one exemplary embodiment, a cap 40 is provided only on the top end of the cover or only on an end of the cover that is easily accessible. As can be seen the cover defines a protective cover for the rod and/or the lock members.

[0021] An opening 42 is formed through the transverse side 36 and an adjacent side 34 of the box 30 to accommodate the handle and to allow for rotation of the handle 24 and thus the rod 16 about the central longitudinal axis of the rod so as to unlock the rod from the upper and lower edges of the container. In the exemplary embodiment shown in FIG. 4, the opening 42 portion formed on the transverse side 36 of the box includes an upper curved wall 44 and a lower curved wall 46. In the shown exemplary embodiment, these walls are define circular sections. With this exemplary embodiment, an extension member 48 is coupled to the rod 18. In an exemplary embodiment, the extension member is welded to the rod. A handle bracket 50 is coupled to the extension member. The handle bracket 50 may be welded to the extension member or may be integrally formed with the extension member. The handle bracket is positioned at a sufficient distance from the rod such that when the handle has rotated the rod to a lock position, the bracket extends just outside of the box, as for example shown in FIG. 4. The handle bracket accommodates a handle arm 52. In an exemplary embodiment, the handle bracket is channel shaped defining a channel 54, as shown in FIG. 5, for accommodating the handle arm. In an exemplary embodiment, the handle arm may bepivotally connected to the handle bracket, or may be welded or otherwise attached to the handle bracket. In an exemplary embodiment, a handle 57 defined by the handle arm 52, handle bracket 50 and extension member 48 may be integrally formed on a single member which is coupled to the rod.

[0022] In an exemplary embodiment, a lock bar or pin 56 extends transversely from the extension member 48. An opening 58 extends through the thickness of the lock bar. When the rod is in a locked position, the lock bar is within the box and is exposed through the opening 42. As can be seen
from FIGS. 4 and 5, the opening 42 is of sufficient dimensions to allow the handle 57 to rotate and rotate the rod about its central longitudinal axis between and locked and an unlocked position. For example the opening in an exemplary embodiment includes a generally circular portion 60 defined by the upper and lower curved walls 44, 46, as well as a rectangular portion 62 extending inward to accommodate the extension member when the handle and rod are in the unlocked position.  

A generally circular disk-like lock 64 is positioned within the opening defined by the upper and lower walls, and includes a pin 66 that penetrates the opening 58 formed through the lock bar 56 extending transversely from the extension member, as for example shown in FIG. 6. The lock 64 includes a slot 68 formed through one of its surfaces for accommodating the lock bar 56. An exemplary embodiment lock is the Metrolock® by Medeco.

To lock the handle and the rod in the locked position, the lock 64 is positioned within the circular portion 60 of the opening 42 formed on the cover such that the lock bar penetrates the slot 68 formed on the lock. The lock 64 is then locked causing the pin 66 to penetrate the opening 58 in the lock bar. The disk-like lock is dimensioned so that it fits concentrically within the circular portion 60 of the opening defined by the upper and lower curved walls 44, 46 and has a diametrical dimension that will cause a peripheral surface 70 of the lock to engage and jam against the upper and lower curved walls when the handle is being pulled in an attempt to rotate the locking rod (FIG. 7). In an alternate exemplary embodiment, the diametrical dimension of the opening defined by the upper and lower curved walls is dimensioned such that the peripheral surface 70 of the lock will engage and jam against such walls when the handle is being pulled in an attempt to rotate the locking bar. Furthermore, the transverse length of the curved walls, i.e., the length of the walls as measured in a direction transverse to the plane of the opening, is chosen so as to ensure that the peripheral surface 70 of the lock will engage and jam against such curved walls when the handle is being pulled in an attempt to rotate the locking bar. In other words, the clearance between the lock and the curved walls is such that the lock will engage and jam against the curved walls, preventing the handle from being rotated to the unlocked position for rotating the lock rod to the unlocked position, as for example shown in FIGS. 9 and 10. The peripheral surface 70 of the lock is defined between the peripheral surface 70 of the lock and the curved walls. In other words, with this exemplary embodiment the diameter of the opening defined by the curved walls is about 10 mm greater than the diameter of the peripheral surface of the lock 64.

In another exemplary embodiment, a lock bar or pin 156 is mounted on the door such that it extends from the door 12 in a direction transverse to the opening when the handle and the locking rod are in the locked position, as for example shown in FIGS. 8A and 8B. The lock bar 156 has a transverse opening 158. With this exemplary embodiment, a lock bar 56 extending from the extension member 48 is not necessary. With this exemplary embodiment, when the lock 64 is used to lock the handle in the locked position, the slot 68 formed through the lock receives the lock bar 156. When the lock is locked, the lock pin 66 penetrates the opening 158 formed through the lock bar 156 for locking the handle in the locked position.

In an exemplary embodiment, as shown in FIG. 8B, the extension member 48 of the handle includes an opening 160 such that when the handle is rotated rotating the locking rod to the locked position, the lock bar 156 mounted on the door 12 penetrates the opening 160. In another exemplary embodiment, the lock bar may be positioned so as to be on the side of the extension member or handle when the handle with the locking rod are rotated to a locked position. With this exemplary embodiment is not necessary that the extension member has the opening 160.

Furthermore, in an exemplary embodiment incorporating the lock bar 156, the dimension of the lock and the diametrical dimension defined by the curved walls 44, 46 bounding the opening 42 portion formed on the transverse side 36 of the cover are not chosen such that the lock peripheral surface 70 would engage the curved walls for preventing rotation of the handle when the handle is being pulled in an attempt to rotate the locking bar to an unlocked position. In another exemplary embodiment, the diametrical dimension of the opening defined by the curved walls 44, 46 is selected such that the peripheral surface 70 of the lock will engage and jam against the curved walls when the handle is being pulled so as to prevent such a rotation. With this embodiment the lock prevents rotation of the handle and thus, the locking rod to the locked position by being locked on to the lock bar 156 mounted on the container door and also prevents rotation of the locking rod to the unlocked position by engaging and jamming against the curved walls.

The handle may be designed such that it has a weak point, as for example on the handle bracket, such that when an excessive force is used to try to rotate the handle, as for example when trying to compromise the locking system, the handle will break off at the weak point, thereby making it more difficult to someone to compromise the locking mechanism.

In an exemplary embodiment, a container may be provided where all the locking systems provided are of the inventive type described herein where the rods are protected in an exemplary cover as described herein and include the locks 64 as shown herein. In another exemplary embodiment, however, one or more exemplary embodiment locking systems are incorporated on the door which includes a stopper plate 14, since for the door that does not include the stopper plate to open, the door with the stopper plate must be opened first. In such an exemplary embodiment, the door without the stopper plate may just include the cover 30, a cutout 72 that is formed across the cover that would allow a handle that is coupled to the locking rod to rotate so as to rotate the rod between the locking and an unlocked position, as for example shown in FIGS. 2 and 9. The handle may be pivotally coupled to a lock bracket 74 that is attached to the rod. With this exemplary embodiment, a conventional bracket may be mounted on the door to receive the handle. A lock such as a pad lock may then be coupled on the bracket to prevent the rotation of the handle out of the bracket and thus prevent the rotation of the locking rod. In an exemplary embodiment, only one of the inventive locking systems is incorporated on a container.

In other exemplary embodiments, conventional lock systems, i.e., systems not including the protective cover 30, may be used on the door without the stopper. In yet further exemplary embodiments, a container is provided which includes only the type of locking system shown in FIG. 9. Although specific exemplary embodiments are disclosed herein, it is expected that persons skilled in the art can and will design or derive alternative embodiments that are...
within the scope of the following claims either literally or under the doctrine of equivalents. For example, the protective cover has been described herein as being a box 30. In other alternate exemplary embodiments the protective cover may have other cross-sectional shapes. For example it may be hexagonal including six wall or have other polygonal shapes, or it may have be formed by one continuous curving surface that is attached to the door, e.g., it may be circular or oval in cross-section. Furthermore instead of a rod other types of rotating members may be used.

What is claimed is:
1. A lock system for locking a container door to a body of a container comprising:
   a rotating member coupled to the door and interfacing with a member extending from the body of the container, wherein rotation of the rotating member about a longitudinal axis of said rotating member in a first direction causes the rotating member to rotate to a first position to lock with the member, and rotation about a second direction opposite the first direction causes the rotating member to rotate to a second position to unlock from the member;
   a longitudinal cover extending over a majority of the rotating member;
   an opening formed through the cover;
   a handle coupled to the rotating member and extending though the opening, said handle being moveable across the opening for rotating said rotating member in the first and second directions; and
   a lock locking onto the handle, said lock having a surface interfacing with the opening for preventing rotation of the rotating member to the second position.
2. The system as recited in claim 1 wherein the cover extends along the entire length of the rotating member.
3. The system as recited in claim 1 wherein the cover extends over the rotating member and the member extending from the body of the container.
4. The system as recited in claim 3 further comprising a cap covering an end of said cover proximate said member extending from the body of the container.
5. The system as recited in claim 1 wherein the opening is bounded at least in part by an opening wall extending generally perpendicular in relation to the rotating member for being engaged by said lock surface thereby interfacing with said opening for preventing rotation of the rotating member to the second position.
6. The system as recited in claim 5 wherein the opening wall defines a generally circular section and wherein the lock is generally circular and wherein said lock surface is a peripheral surface of said lock.
7. The system as recited in claim 6 further comprising a bar extending from the handle, wherein the lock interlocks with said bar.
8. The system as recited in claim 1 wherein the handle comprises:
   a first handle portion coupled to the rotating member;
   a bracket coupled to the first handle portion, said bracket extending outside of the cover during operation of the handle; and
   a handle arm coupled to the bracket.
9. The system as recited in claim 1 wherein the handle comprises a section extending outside the cover designed to break prior to a remaining portion of the handle when exposed to a force.
10. The system as recited in claim 1 wherein the cover comprises two parallel walls extending from the door and a transverse wall there between defining a box like structure with the door.
11. The system as recited in claim 1 wherein the cover is a box structure comprising four walls.
12. The system as recited in claim 1 wherein the cover in combination with the door and said perimetal portion of the container encapsulate the rotating member and the member extending from the body of the container when said door is in a closed position.
13. A system for locking a container door to a body of a container comprising:
   a rotating member coupled to the door for interfacing with a member extending from the body of the container, wherein rotation of the rotating member about a longitudinal axis in a first direction causes the rotating member to rotate to a first position for locking with the member extending from said body, and rotation about a second direction opposite the first direction causes the rotating member to rotate to a second position for unlocking from the member extending from said body;
   a longitudinal cover extending over a majority of the rotating member;
   an opening formed through the cover; and
   a handle coupled to the rotating member and extending though the opening, said handle being moveable through the opening for rotating said rotating member in the first and second directions.
14. The system as recited in claim 13 further comprising a lock for preventing rotation of the rotating member to the second position.
15. The system as recited in claim 14 wherein said lock engages the cover when the handle is being moved toward the second position for preventing rotation of the rotating member to the second position.
16. The system as recited in claim 14 further comprising a bar mounted on the door, wherein the lock engages said bar for preventing rotation of the rotating member to the second position.
17. The system as recited in claim 16 wherein said lock engages the cover when the handle is being moved toward the second position for preventing rotation of the rotating member to the second position.
18. The system as recited in claim 16 wherein the handle comprises an opening penetrated by said bar when the rotating member is in the first position.
19. The system as recited in claim 16 wherein the lock is generally circular in plan view and wherein the opening formed through the cover comprises a circular portion, wherein said lock is concentric with and occupies said circular portion.
20. The system as recited in claim 14 wherein the lock is generally circular in plan view and wherein the opening formed through the cover comprises a circular portion, wherein said lock is concentric with and occupies said circular portion.
21. The system as recited in claim 14 wherein the opening is bounded at least in part by a peripheral wall and wherein said lock engages said peripheral wall for interfacing with the cover for preventing rotation of the rotating member to the second position.
22. The system as recited in claim 13 wherein the cover extends along the entire length of the rotating member.

23. The system as recited in claim 13, wherein said cover is designed for also extending over said member extending from the body of the container when the door is closed.

24. The system as recited in claim 13 further comprising a cap covering an end of said cover, said cap positioned for extending above said member extending from the body of the container when the door is closed.

25. The system as recited in claim 13 wherein the handle comprises:
   a first handle portion coupled to the rotating member;
   a bracket coupled to the first handle portion, said bracket extending outside of the cover during operation of the handle; and
   a handle arm coupled the bracket.

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