Means to secure containers on railway flat cars including a releasable lock carried by a corner support for the container and adapted to engage the lower corner of a container at an opening within the corner fitting of the container. The lock automatically secures the container upon the lowering of the container onto the corner supports and is released by a vertical lifting of the container from the corner supports upon a predetermined force exerted by the center against the lock upon the vertical lifting of the container. The container is retained on the corner supports by the locks until a predetermined lifting force is exerted whereby the container is released without any manual actuation of the container securing means.
CONTAINER SECURING MEANS FOR RAILWAY FLAT CARS

This is a continuation of application Ser. No. 711,373 filed 3/7/68 now abandoned.

BACKGROUND OF THE INVENTION

When corner supports are employed to support the lower corners of a container, the weight of the container normally prevents a vertical lifting of the container. However, under certain conditions such as a substantial wind load on an empty container, a vertical lifting force may be developed which is somewhat greater than the vertical down force resulting from the weight of the container. For this reason, a manual locking device, consisting of a handle with a pin engaging a hole in the container, has been employed heretofore for the corner supports. The manual locking device requires manual actuation while loading and unloading which is time consuming and requires workmen for actuating the pins. Also, in the event the containers are employed for unloading purposes, a crane operator can only observe the locking devices for two of the four corners and may cause damage if either of the unobserved locking devices is engaged. Further, the locking pins may be easily removed manually, either inadvertently or by tampering, and this may result in the transport of the container with one or more of the locking pins in an unlocked position.

DESCRIPTION OF THE INVENTION

The present invention relates to means to releasably lock the container in seated position on container corner supports without requiring any separate manual movement of the locking means for either locking or unlocking. The locking means includes an inwardly extending protuberance adapted to be received within an opening in the lower corner of a container and having upper and lower inclined cam surfaces. The container as it is being lowered engages the upper cam surface and urges the protuberance outwardly for seating of the container with the protuberance snapping inwardly under the bias of resilient means and being received within the container opening as the protuberance is aligned with the container opening. The lower cam surface is inclined at an angle between about 15° and 35° with respect to the horizontal and is of an arcuate contour generally approximating the curvature of the lower arcuate edge of the container corner which defines the container opening receiving the protuberance. Upon an upward lifting force applied to the container, the arcuate edge defining the lower portion of the container opening engages the lower cam surface of the locking means and removal or unloading of the container is prevented until a predetermined minimum lifting force is reached which may be around 1,500 pounds for each container support. Resilient means urge the protuberance inwardly and is of dimensions so proportioned as to permit an outward movement of the locking means when the predetermined lifting force is reached. Thus, for forces normally encountered in train action, the container is restrained against vertical movement. However, when a predetermined minimum lifting force is reached, such as from crane or overhead unloading, the locking means will then be cammed outwardly for release of the container.

The invention accordingly comprises the constructions hereinafter described, the scope of the invention being indicated in the following claims.

In the accompanying drawings, in which one of various possible embodiments of the invention is illustrated,

FIG. 1 is a plan of a railway flat car having container corner supports mounted thereon for carrying containers;

FIG. 2 is an enlarged plan of a container support in erect position on the deck of the railway flat car and illustrating in broken lines the retracted position of the container support;

FIG. 3 is a side elevation of the container corner support shown in FIG. 2 with retracted and travel positions of the support being indicated in broken lines;

FIG. 4 is an enlarged end elevation of the container support in erect position on the deck of a railway flat car;

FIG. 5 is a view taken generally along line 5—5 of FIG. 4 and illustrating the locking means for engaging an opening in the lower corner of a container partially shown in broken lines seated on the support;

FIG. 6 is a view similar to FIG. 4 but showing the container being lowered onto the support and camming the locking means outwardly;

FIG. 7 is a view similar to FIG. 6 but showing the container being lifted from the flat car with a lifting force exceeding the predetermined minimum thereby to cam the locking means outwardly for releasing the container;

FIG. 8 is a side elevation of the locking means removed from the support and illustrating the upper and lower cam surfaces for engaging the container, and,

FIG. 9 is a front elevation of the locking means shown in FIG. 8.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawings.

Referring to the drawings for a better understanding of this invention and more particularly to FIG. 1, a railway flat car is generally indicated 10 and has a generally flat deck 12. An end guideway section generally indicated 14 is positioned between a bolster structure 16 and the adjacent end of the railway car. An intermediate guideway section generally indicated 18 is positioned between the bolster structures 16. Guideway sections 14, 18 are formed by spaced Z-members 20, 22 having a slot 24 therebetween as shown in FIG. 4.

Mounted in slots 24 for sliding movement therealong the container supports generally indicated 26. Supports 26 may be releasably positioned at various positions along the length of guideway sections 14, 18 to adapt flat car 10 for carrying a plurality of containers of various lengths such as 10 feet, 20 feet, 24 feet, 30 feet, and 40 feet. It is to be understood that only one-half the length of flat car 10 is illustrated in FIG. 1, the remaining length of the flat car being similar to that shown in FIG. 1.

As shown particularly in FIGS. 2 and 3, deck 12 has cutout portions 28 adjacent the ends of guideway sections 14, 18 and supports 26 are adapted to be folded to retracted positions within cutout portions 28 to form closures for the cutout portions whereby highway traffic may be driven over deck 12 when flat car 10 is employed for the transport of trailers. Each container C has a lower corner fitting or cap 30 at each lower cor-
ner thereof. Each corner fitting 30 is generally rectangular in transverse and longitudinal cross sections and comprises a bottom wall 32, an upper wall 34, outer and inner side walls 36, 38 and end walls 40. Outer side wall 36 has an elongate opening 42 therein as shown particularly in FIG. 5. An arcuate edge 44 defines the lower portion of elongate opening 42 and an arcuate edge 46 defines the upper portion of opening 42. Arcuate edges 44 and 46 are struck from a 1 inch radius.

Container support 26 comprises a lower base 48 adapted to rest on the upper surface of deck 12. An upper base or seat 50 supports the lower corner of a container C and a pair of connected vertical walls 52, 54 extend upwardly from seat 50. Side wall 52 and end wall 54 are arranged in a right angular relation to each other and restrain the container against horizontal movement. For further details of container support 26, reference is made to copending application Ser. No. 565,420 filed July 15, 1966, the entire disclosure of which is incorporated by this reference.

The present invention provides means to restrain the container against an upward vertical movement or lifting below a predetermined lifting force. The locking member is actuated without any manual actuation being required and comprises a lock lever 56 mounted adjacent its lower end on pin 58 which forms a fixed horizontal axis. Pin 58 is carried by extensions 60 secured to base 48 and forms a fixed horizontal axis for lever 56. Lever 56 may pivot back and forth on pin 58 in a vertical plane.

Continuously urging lock lever 56 inwardly is a spring 62 mounted about a rod 64 pivotally connected at 66 to lever 56. Spring 62 is biased between an intermediate wall 68 of support 26 and a retainer washer 69 on the extending end of rod 64. Nut 71 is threaded on the extending end of rod 64 to secure washer 69. Mounted adjacent the upper end of lever 56 is an inwardly extending protuberance generally indicated 70 and having an upper cam surface 72 and a lower cam surface 74. Protuberance 70 and the upper portion of lever 56 are adapted to extend within an elongate slot 76 in side wall 52 as shown particularly in FIG. 5. Protuberance 70 also is received within opening 42 of the lower corner of container C as shown in FIG. 4 when the container is seated on seat 50 and extends a distance X of around 1 inch from the inner face of side wall 52 as illustrated in FIG. 4. Container C, if properly centered on support 26, is spaced a distance Y of ¾ inch from the inner face of side wall 52 as shown in FIG. 4. Distance Y may be as high as ½ inch from the inner face of side wall 52 when container C is not centered.

Lower cam surface 74 is spaced a distance of around ½ inch from the lower arcuate edge 44 defining opening 42 when container C is fully seated as shown in FIG. 4. Cam surface 74 is proportioned to be urged outwardly by contact with arcuate edge 44 at an optimum upward lifting force of around 1,500 pounds or between 1,000 and 2,000 pounds. It should be noted that an upward lifting force of 1,500 pounds would be required for each support 26 which would require a total lifting force for the container of 6,000 pounds.

As shown in FIGS. 8 and 9, an upwardly inclined angle A of around 25° with respect to the horizontal has been found to be optimum for cam surface 74. An angle A of between 15° and 35° would function effectively. As cam surface 74 engages the arcuate edge 44 defining opening 42, cam surface 74 is struck from a one inch radius corresponding to the radius from which arcuate edge 44 is struck. Therefore, a relatively large surface contact is provided between cam surface 74 and arcuate edge 44 when lifting of container C from railway car 10. While angle A increases as lever 56 is urged outwardly, the tension in spring 62 also increases to increase the resistance to the outward movement of lever 56 thereby to compensate for the increase in angle A.

Upper cam surface 72 is engaged by the lower container wall 32 upon loading of the container as illustrated in FIG. 6. Cam surface 72 is proportioned so that lever 56 will be forced outwardly by wall 32 by a force or weight of around 500 pounds. As four supports 26 are required for each container, a total weight of around 2,000 pounds would be required for seating of container C. An empty container of 20 feet long, 8 feet wide and 8 feet high weighs around 6,000 pounds. An angle B for cam surface 72 of around 55° with respect to the horizontal has been found to be optimum. An angle B between around 40° and 70° would function satisfactory.

For loading, a container C is lowered onto supports 26 and the lower surfaces of walls 32 on the container corners contact upper cam surfaces 72 to urge lock levers 56 outwardly. When openings 42 are aligned with protuberances 70, levers 56 snap inwardly under the bias of springs 62 as shown in the fully seated position of the container shown in FIG. 4.

Upon unloading, container C is lifted from supports 26 and upon an upward movement of around ½ inch arcuate edges 44 engage cam surfaces 74 and container C is restrained against upward movement until a force of around 1,500 pounds is reached for each support 26. When the lifting force exceeds the predetermined force, levers 56 are urged outwardly to withdraw protuberances 70 from openings 42 to permit container C to be removed.

The tension in spring 62 and the slope of lower cam surface 74 shown by angle A are so designed that once upward force is required to move locking member or lever 56 outward than will result from the wind load and other design loads. However, the force required to bias lever 56 outwardly is relatively small in comparison to the forces which may be developed by a crane in unloading fully loaded containers.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results obtained.

As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:
1. A railway flat car comprising a deck; a plurality of container supports on the deck; a container having lower corners supported on the container supports, each of said lower corners having a generally elongate side opening therein extending in a generally vertical direction with an arcuate concave edge defining the lower portion of the elongate opening; said container support having a generally horizontal seat to support the lower corner of the container and a pair of connected walls arranged in a right angular relation to...
form side and end walls extending upwardly from the seat to restrain the container against horizontal movement; said support further comprising an intermediate wall extending longitudinally of the car below said horizontal seat; the side wall adjacent the elongate side opening having a slot in horizontal alignment therewith; a releasable locking lever on each container support; means mounting the locking lever upon said side wall below said slot for generally pivotal movement adjacent the side wall about a generally horizontal axis extending longitudinally of the car; the upper portion of said locking lever having a protuberance extending within the slot and adapted to extend within the elongate container opening for restraining the container against upward movement at a lifting force below a predetermined minimum lifting force; resilient means urging the upper portion of the locking lever and protuberance inwardly into the container opening; said resilient means comprising a rod pivotally connected at one end to said locking lever below said seat, said rod passing through an opening in said intermediate wall, and having a compression spring mounted thereon and held in place by said intermediate wall and fastening means at the opposite end thereof, said protuberance having a lower cam surface for contacting said arcuate concave edge defining the lower portion of the elongate container opening, said lower cam surface being inclined upwardly with respect to the horizontal and being generally arcuate and convex in cross section to fit against the adjacent concave edge of the wall defining the lower portion of the elongate container opening in a generally nested relation when the container is lifted from the support; said protuberance further having a downwardly inclined upper cam surface adapted to contact the container upon lowering of a container onto the container support for urging the protuberance outwardly against the bias of said resilient means, the protuberance being urged within the container opening by the resilient means upon seating of the container on the support; and an upward movement of the container being restrained by the lower cam surface on said protuberance until a predetermined minimum upward force is exceeded whereupon said protuberance is urged outwardly to release the container.

2. A railway flat car according to claim 1 wherein said fastening means include means for varying the compressive strength of said coil spring.

3. A railway flat car according to claim 1 wherein the arcuate edge of said lower cam surface is struck from a radius not substantially exceeding the radius from which the arcuate edge of said elongate opening is struck.

4. A railway car according to claim 3 wherein the arcuate edge of said lower cam surface is struck from a radius not exceeding about 1 inch.

5. A railway car according to claim 4 wherein the arcuate edge of said lower cam surface and the arcuate edge of said elongate opening are struck from radii lengths which are substantially equal.

6. A railway flat car according to claim 1 wherein said lower cam surface is inclined upwardly at an angle of from about 15° to about 35° with respect to the horizontal.

7. A railway flat car according to claim 6 wherein said upper cam surface is inclined downwardly at an angle between about 35° and about 70° with respect to the horizontal.