

Jan. 19, 1971

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3,556,580

METHOD AND APPARATUS FOR LIFTING FREIGHT CONTAINERS

Filed Aug. 21, 1968

4 Sheets-Sheet 1

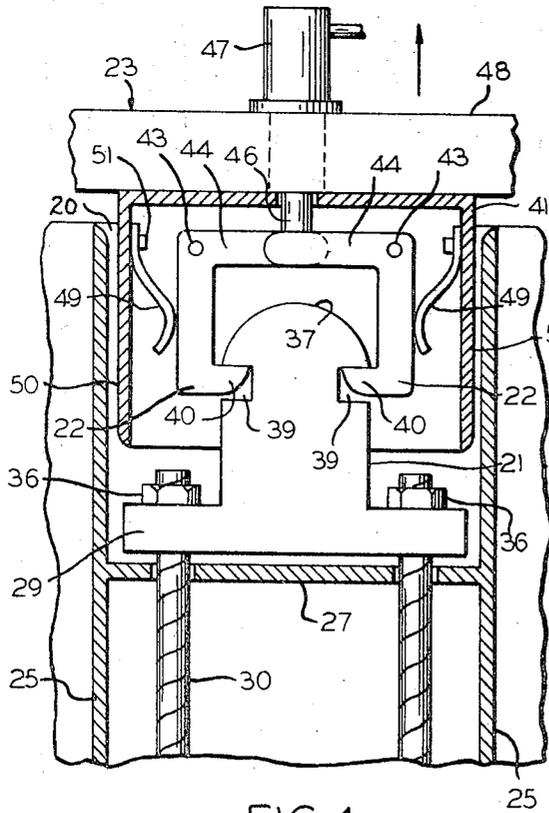
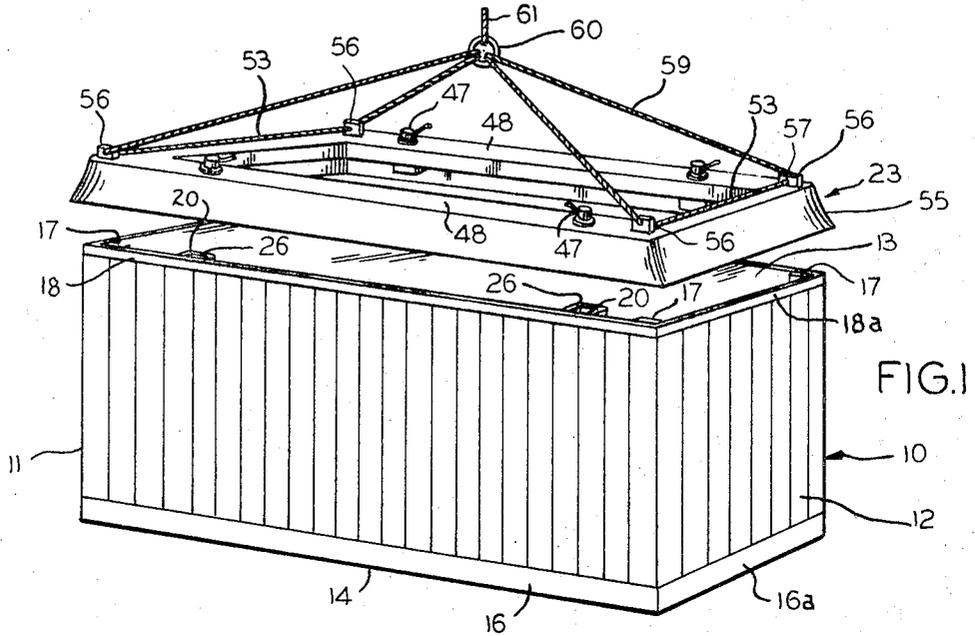


FIG. 4

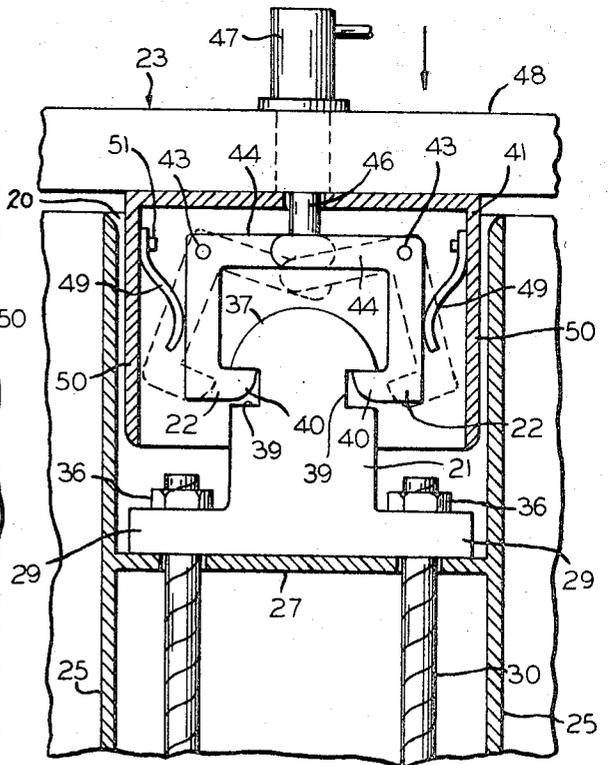


FIG. 5

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4 Sheets-Sheet 2

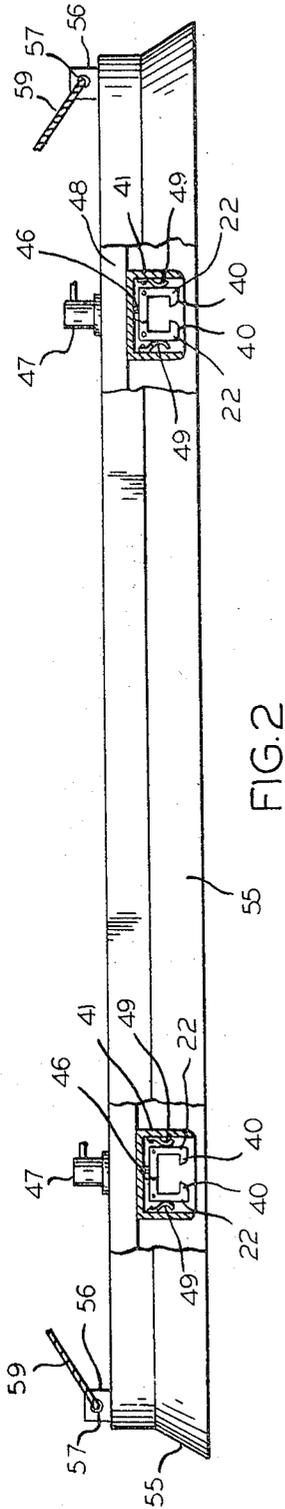


FIG. 2

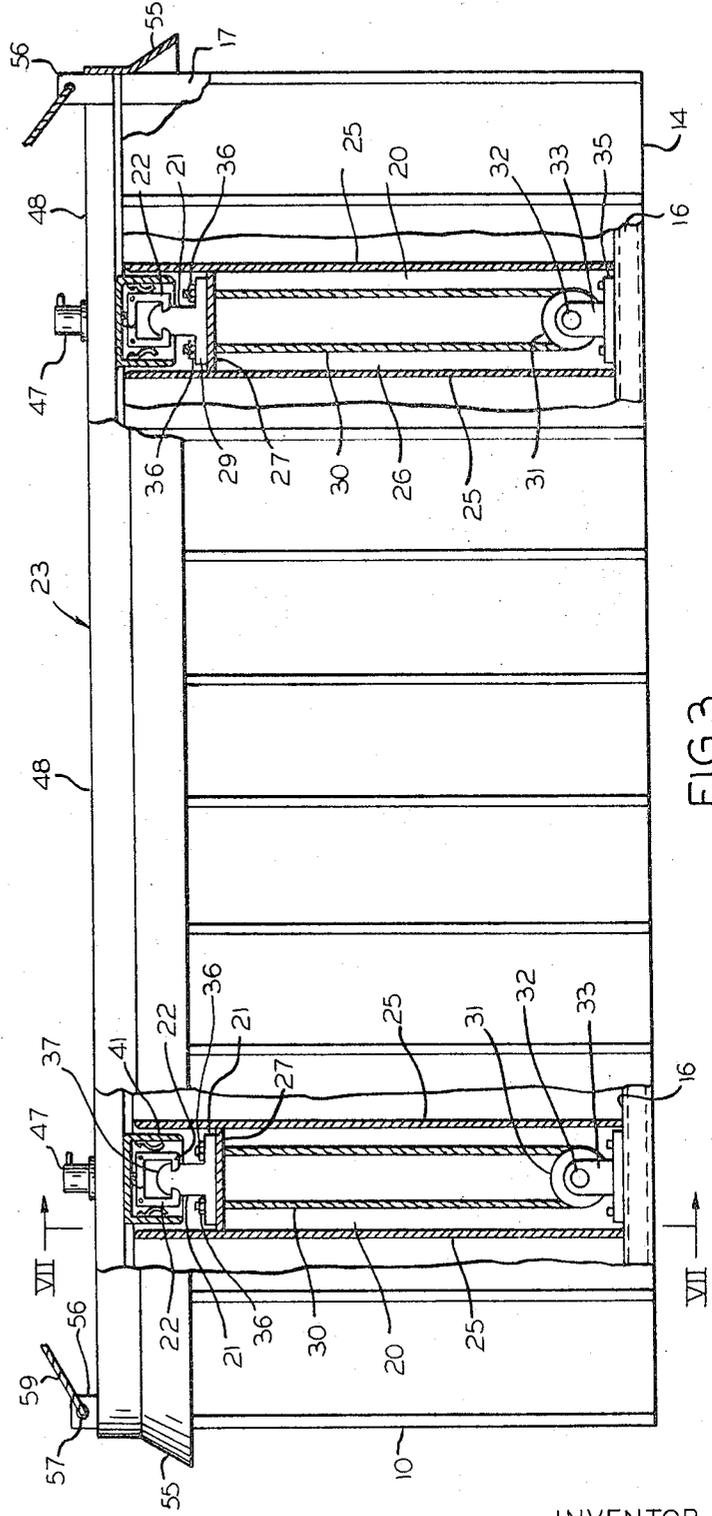


FIG. 3

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4 Sheets-Sheet 3

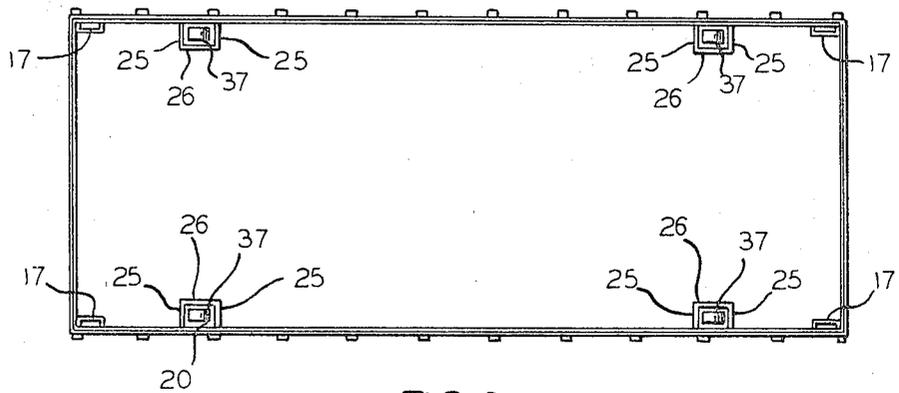


FIG. 6

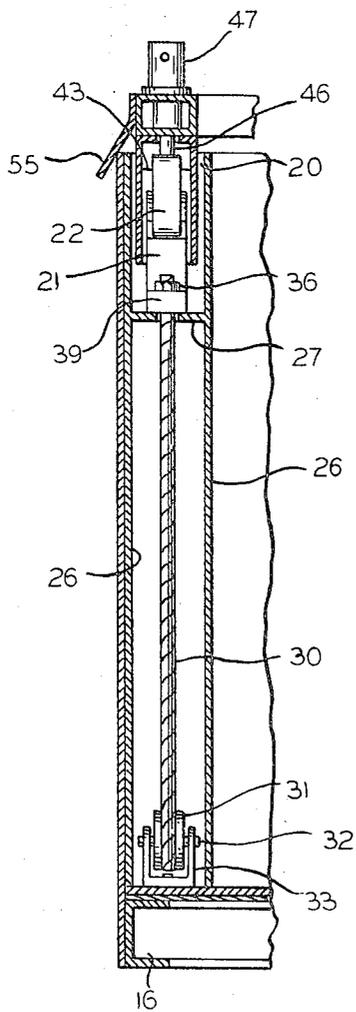


FIG. 7

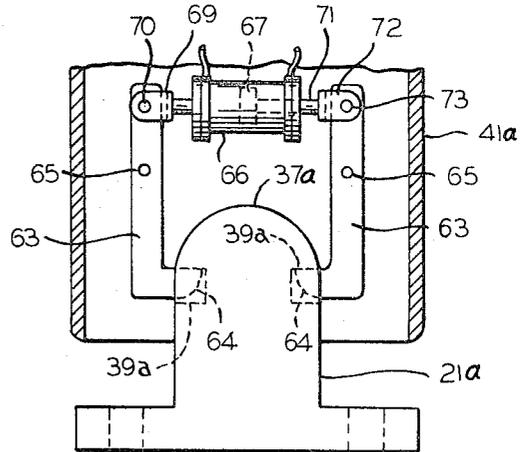


FIG. 8

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4 Sheets-Sheet 4

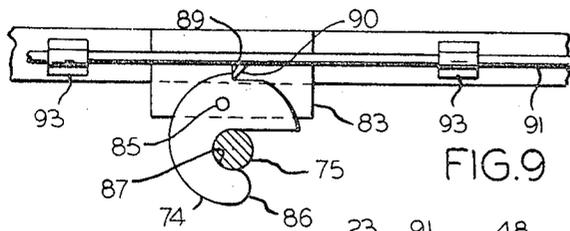


FIG. 9

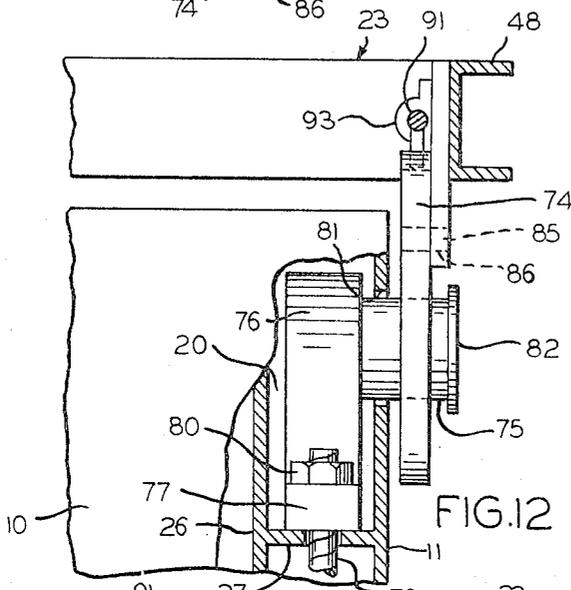
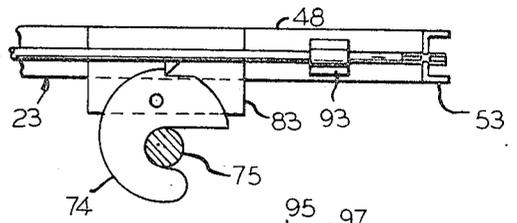


FIG. 11

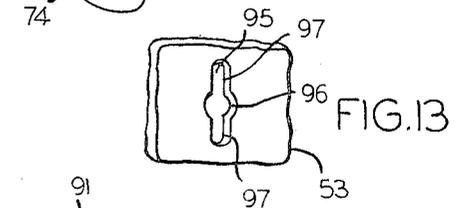


FIG. 12

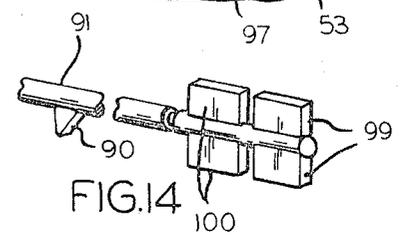


FIG. 13

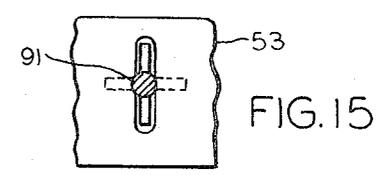


FIG. 14

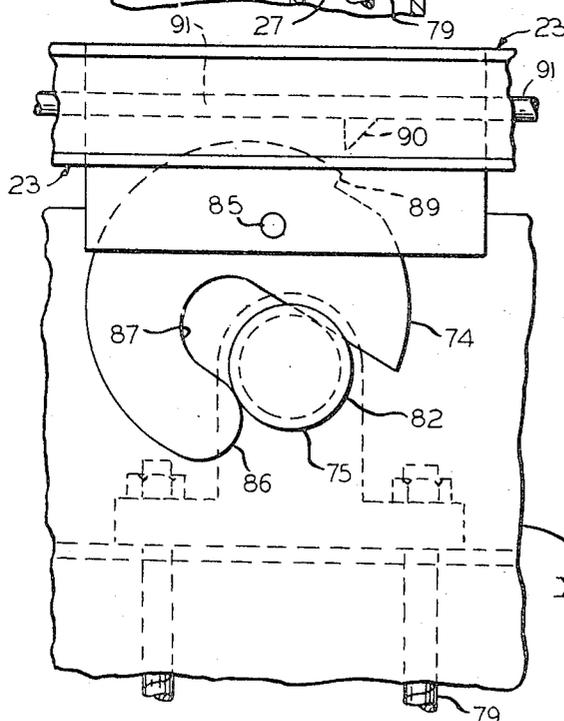


FIG. 15

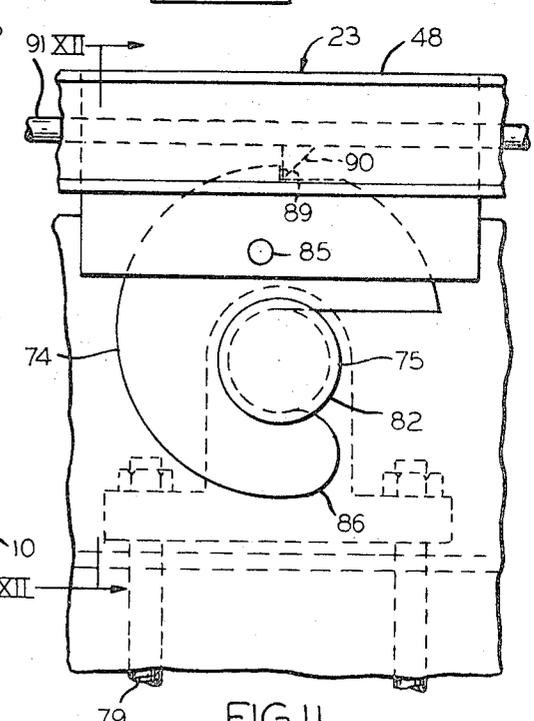


FIG. 16

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**METHOD AND APPARATUS FOR LIFTING
FREIGHT CONTAINERS**

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Int. Cl. B66c 1/10

U.S. Cl. 294—81

12 Claims

ABSTRACT OF THE DISCLOSURE

Lifting apparatus for containers for freight adapted to lift containers of various overall lengths. The lifting apparatus is in the general form of an open rectangular saddle, generally conforming to the forms of the containers to be lifted and may be suspended from a gantry and the like and contains a series of latches spaced along opposite sides of the saddle in such relation as to have latching engagement with keepers carried by the containers in the same spacing as the latches. The keepers are mounted adjacent the upper ends of the containers for limited vertical movement with respect to the containers and are connected to the containers at the bottoms of the containers, to exert lifting forces on the containers through flexible cables. The cables are connected to the keepers at their free ends and have bights intermediate their ends extending about sheaves fixedly secured to the bottom beams of the containers.

BACKGROUND OF THE INVENTION

Freight containers, such as have formerly been carried on trailers and transferred to freight cars or ships are of various lengths and are as long as forty feet. A forty-foot container is usually in the form of a thin metal skin covering a frame structure and when loaded may weigh as much as 80,000 pounds.

Such containers have been loaded onto freight cars, trailers pulled by tractors, ships and the like by a crane or gantry placing the container on a trailer or freight car for transportation, and lifting the container from a trailer onto a freight car or from trailers and freight cars onto ships, and vice versa. With such lifting devices and containers, lifting has been through the end posts of the container and the lifting loads have been taken directly at the tops of the end posts and top of the container. This subjects the container to buckling stresses, frequently buckling the containers intermediate their ends and particularly the longer containers.

SUMMARY AND OBJECTS OF THE INVENTION

A principal object of the present invention is to remedy the foregoing deficiencies in handling freight containers by providing an improved form of lifting apparatus and container, so arranged as to exert lifting forces on the container from the bottom thereof and inwardly of the ends thereof to avoid buckling or deforming of the container as being lifted and lowered from one vehicle to the other.

Another object of the invention is to improve upon the lifting devices for freight containers and the like heretofore in use, by providing a lifting saddle generally conforming to the form of the container, and having uniformly spaced latching devices spaced inwardly of the ends thereof, and adapted to have latching cooperation with associated keepers carried by the container, inwardly of the ends thereof, arranged to transmit the lifting loads to the containers along the bottoms thereof and inwardly of the ends thereof.

Still another object of the invention is to provide an improved form of freight container having lifting attachments as a part thereof, inwardly of the ends thereof, and

transmitting the lifting loads on the container to the bottom of the container and inwardly of the ends of the container, to avoid buckling or distortion of the container during the lifting operation thereof.

Still another object of the invention is to provide a simple and improved form of lifting system for freight containers and the like, in which a saddle in the form of an open framework, generally conforming to the form of the container to be lifted, carries a series of uniformly spaced latching devices inwardly of the ends of the saddle and spaced corresponding to associated keepers carried by the container, in which the keepers are connected with the container by flexible cables, extending within and along the walls of the container and connected to the container at the bottom thereof.

These and other objects of the invention will appear from time to time as the following specification proceeds and with reference to the accompanying drawings.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a freight container constructed in accordance with the principles of the present invention, showing a lifting saddle in position to be lowered into lifting engagement with the container.

FIG. 2 is a view in side elevation of the saddle shown in FIG. 1, with parts of the saddle broken away and other parts shown in vertical section, and illustrating one form of latching device for lifting the container upon vertical lifting movement of the saddle.

FIG. 3 is a view in side elevation of a container constructed in accordance with the principles of the present invention, having a lifting saddle in lifting engagement therewith with parts of the container and saddle broken away, and other parts shown in vertical section in order to illustrate the lifting latch and keeper arrangement transferring the forces of lifting to the bottom of the container, as lifting the container for transfer to or from a vehicle such as a railway car, truck or the like.

FIG. 4 is an enlarged detail partial fragmentary vertical sectional view taken longitudinally of the container and lifting saddle with certain parts broken away, and showing certain details of a form of lifting latch and keeper arrangement which may be used to carry out the principles of the invention.

FIG. 5 is a view somewhat similar to FIG. 4, but illustrating the saddle in the act of lowering the container and showing in dotted the release position of the lifting latch mechanism.

FIG. 6 is a top plan view of the container shown in FIGS. 1 and 3 with the top wall removed.

FIG. 7 is a fragmentary transverse vertical sectional view taken substantially along line VII—VII of FIG. 3.

FIG. 8 is an enlarged detail view illustrating a modified form of latching arrangement from that shown in FIGS. 1 to 7.

FIG. 9 is a fragmentary longitudinal sectional view with certain parts broken away, and showing still another modification of keeper and latching arrangement constructed in accordance with the principles of the present invention.

FIG. 10 is an enlarged fragmentary detail view showing the latching arrangement of FIG. 9 with a latch coming into its locked position with the keeper.

FIG. 11 is a view like FIG. 10 and showing the latch in its latched and lifting position.

FIG. 12 is a partial fragmentary transverse sectional view taken substantially along line XII—XII of FIG. 11.

FIG. 13 is an enlarged detail view, illustrating the slotted web of the end beam of the saddle for locking the latch in a locked lifting position.

FIG. 14 is a view illustrating the locking dog and operating rod therefor with the means for operating the rod

and locking dog, and locking the rod in position, shown on the rod; and

FIG. 15 is a partial fragmentary view with certain parts shown in section in order to illustrate certain details in the latch locking and release mechanism not shown in FIGS. 9 to 14 inclusive.

DESCRIPTION OF PREFERRED EMBODIMENTS OF INVENTION

In the form of the invention illustrated in FIGS. 1, 2 and 3 of the drawings, I have shown a container for freight, adapted to be loaded onto railway cars, trailers, trucks, ships and the like. The container 10 is of a generally rectangular box-like form and may be of various selected lengths and of widths substantially equal to the width of the railway car. The container 10 has parallel side walls 11 and end walls 12 connecting the side walls together. The container also has a top wall 13 and a parallel bottom wall 14. One end wall may have doors therein (not shown) accommodating the container to be loaded from the rear thereof. The top, bottom and side and end walls of the container are usually made from a relatively thin metal skin secured to a supporting and reinforcing frame structure including bottom and end channels 16, 16a and end posts 17 extending upwardly therefrom at the corners of the container. Rails 18 and 18a extend along the tops of the side and end walls and form a reinforcing structure therefor.

Within the side walls 11 adjacent but spaced inwardly of opposite ends thereof is a series of wells 20 extending for the height of said side walls. Keepers 21 cooperating with latches 22 depending from a cradle or saddle 23 are carried in said wells for limited vertical movement with respect thereto to effect lifting movement of the container 10 upon lifting movement of said saddle as the latches 22 are in lifting latching engagement with the keepers 21, to lift the container from or onto a freight vehicle or ship, by a conventional gantry or crane (not shown).

The wells 20, 20 may be spaced apart uniform distances on all containers to enable one lifting saddle 23 to be used to lift a wide variety of lengths of containers where suitable. Each well includes a pair of parallel spaced side walls 25 extending upwardly of the bottom channel 16 and closed by inner and outer parallel spaced inner and outer end walls 26 (FIG. 7).

A horizontal partition 27 extends across the well 20 adjacent the upper end thereof and forms a support for a base 29 for the keeper 21. The keeper 21 is connected with the channel 16 to exert an upward lifting force thereon by a flexible cable 30 freely extending through the partition 27 and trained about a sheave 31. Said sheave is carried by a shaft 32, mounted at its ends in a bifurcated support 33, having a base 35 bolted or otherwise secured to the channel 16. The free ends of the cable 30 extend through the base 29 for the keeper, and are retained to said base, as by nuts 36 threaded thereon.

The lifting forces of the saddle and latches 22 on the container 10 are thus taken through the keeper and transferred from the keeper to the channel 16 through the flexible cable 30.

The keeper 21 as shown in FIGS. 3, 4 and 5 has a rounded upwardly facing strike surface 37, terminating in oppositely opening notches 39, opening to opposite sides thereof and engaged by inwardly extending bolt ends 40, on the lower ends of the latches 22, 22 and forming latch bolts lifting the keepers 21 and container 10 through the cables 30.

The latches 22 are shown in FIGS. 4 and 5 as being in the general form of bell cranks pivoted to a downwardly opening box-like guide 41 intermediate their ends on pivot pins 43 and having operating arms 44 extending inwardly of the pivot pins 43 and engaged by the bottom end of a piston rod 46, extensible from a cylinder 47, mounted on the top of a side frame member 48 of the

saddle 23. The cylinder 47 may be an air cylinder and is supplied with air at the head end thereof to extend the piston rod 46 and release the bolt ends 40 of the latches 22 from the slots 39, to thereby accommodate the saddle 23 to be lifted above the container 10. The bolt ends 40 of the latches 22 are biased into engagement with the notches 39 of the keeper 21 by individual leaf springs 49, mounted on the insides of end walls 50 of the box-like guide 41, on machine screws 51 or any other suitable securing means.

The downwardly opening rectangular box-like guide 41 thus serves as a support for the latches 22 and also serves as a guide moveable within the wells 20 between the side walls 25 and end walls 26 thereof, to register the bolt ends 40 of the latches 22 with the upwardly facing rounded strike surfaces 37. As the bolt ends 40 engage the rounded faces of the strike surfaces 37 during lowering movement of the saddle 23, said strike surfaces 37 will cam the latches 22 about the axes of the pivot pins 43 into open positions to accommodate the leaf springs 49 to engage the bolt ends of said latches with notches 39.

The saddle 23 is generally shown in FIG. 1 as being a rectangular frame conforming to the perimeter of the container 10 and including the side frame members 48 supporting the cylinders 47 and the downwardly opening box-like guides 41, and connected together by end frame members 53, providing an open framework of a width equal to the width of the container and of a length which is as long as or longer than the length of the container being lifted. A downwardly and outwardly flaring skirt 55 extends about the side walls 48 and end walls 53 of the saddle 23 and depends therefrom and serves as a guide means to align the saddle with the container and register the depending box-like guides 41 with the wells 20 to accommodate the latches 22 to come into latching engagement with the keepers 21 as the saddle 23 is lowered on top of a container 10.

The saddle 23 has spaced lugs 56 extending upwardly therefrom, adjacent the corners thereof, and having eyes 57 extending therethrough, to accommodate the attachment of slings 59 thereto. Each sling 59 is shown as being in the form of an endless flexible cable extending through a common ring 60 intermediate its ends, and extending through the eyes 57 of the lugs 56 at the adjacent ends of the saddle. The ring 60 may be engaged by a hook 61 suspended from a gantry or other lifting device to effect lifting and lowering movement of the saddle 23 in a conventional manner.

In FIG. 8 of the drawings I have shown a modified form of latch mechanism in which cooperating latch arms 63 are transversely pivoted intermediate their ends in a box-like guide 41a and have latching cooperation with a keeper 21a like the keeper 21 shown in FIGS. 3, 4 and 5. The latch arms 63 have bolt ends 64 cooperating with outwardly opening recesses or slots 39a in the keeper 21a, and are pivoted intermediate their ends in the downwardly opening box-like guide 41 on transverse pivot pins 65. A double acting cylinder 66 having a piston 67 therein is connected between the upper ends of the latch arms 63. As shown in FIG. 8, a bifurcated clevis 69 is secured to and extends from the head end of the cylinder 66 along opposite sides of the latch arm 63, and is pivoted thereto as by a pivot pin 70. A piston rod 71 extends from the piston 67 through the piston rod end of the cylinder 66 and has a clevis 72 on its end extending along opposite sides of a latch arm 63, and pivoted thereto as by a pivot pin 73. The admission of fluid under pressure to the piston rod end of the cylinder 66 will thus release the bolt ends 64 of the latch arms 63 from the notches 39, and the admission of fluid under pressure to the head end of the cylinder 66 will engage the bolt ends of the latches 23 with the notches 39. Sufficient pressure may be admitted to the head end of the cylinder 66 to accommodate the rounded strike surface 37 of the keeper 21 to cam the bolt ends of the latch arms 63 outwardly

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and then to accommodate pressure on the head end of said cylinder to engage the bolt ends 64 of the latch arms 63 with the notches 39a and hold said bolt ends in engagement with said notches, as fluid under pressure is held in the head end of the cylinder 66. The foregoing latching arrangement may be positively engaged and released under the control of the operator lifting and lowering the saddle 23, to give assurance to the operator that the saddle is positively locked to the container, to effect lifting and lowering thereof.

In FIGS. 9 to 15 I have shown still another form of latching mechanism operating along the principles of the present invention, in which the latches are in the form of disk-like freely pivoted offcenter latches 74 and the keepers are in the form of keeper pins 75, extending laterally of the side walls 11 of the container 10. As shown in FIGS. 10, 11 and 12, the keeper pins 75 extend outwardly of supports 76, guided in the wells 20 for limited vertical movement with respect thereto. Each support 76 is shown as having a base 77 resting on a partition or ledge 27 in the well 20, and connected with a container 10 to effect lifting and lowering movement thereof through a flexible cable 79. The flexible cable 79 has a bight portion extending about a pulley 31 mounted at the bottom of the container on the beam 16 and extends through the partition 27, and is secured to the base 77 as by nuts 80 threaded on free ends of the cable 79 and suitably locked thereto, as in the form of the invention illustrated in FIGS. 4, 5 and 7.

Each keeper pin 75 extends through a slot 81, in a side wall 11 of the container and outwardly of said side wall and has an enlarged head 82 at its outer end. The slot 81 is of sufficient length to take care of stretch and slack in the cable 79, to accommodate the keeper pins to lift the container and transfer the lifting forces to the bottom beam 16 of the container.

The offcenter latch 74 is pivotally mounted eccentric of its center on the inside of a support plate 85 depending from a side frame member or beam 48 of the saddle 23. As shown in FIGS. 9, 10, 11 and 12, the support plate 85 extends along the inside of the web of the beam 48 for the height thereof and depends from said beam to form a support for a pivot pin 86 for the latch 74.

The latch 74 has a rounded striker nose 86 terminating into a notch or recess 87 extending inwardly therefrom and conforming to and adapted to have latching engagement with the keeper pin 75. The latch 74 has a generally circular periphery extending from the rounded striker nose 86 and having a locking notch 89 therein adapted to be engaged by at latch dog 90, depending from a rod 91, guided for slidable movement along the inside of the support plate 85 and beam 48 on spaced bearing bosses 93 secured to the web of the beam 48 and extending inwardly therefrom.

Thus, when the rod 91 is moved along the bearing bosses 93, to disengage the locking dog 90 from the notch 89, the eccentric latch 74 will be positioned by gravity about the axis of the pivot pin 85 in position to come into latching engagement with the keeper pin 75, and be cammed thereby to move from the position shown in FIG. 10 to the latching position shown in FIG. 11 as the saddle 23 is lowered to pick up the container 10. The locking dog 90 may then be moved into engagement with the notch 89 to positively lock the latch 74 in latching engagement with the keeper pin 75, to effect lifting movement thereof upon lifting movement of the saddle 23.

As shown in FIGS. 9, 13, 14 and 15, the rod 91 slidably extends through the web of the end beam 53 of the saddle 23, and is rotatable with respect to said end beam. The web of the end beam 53 has a vertically extending slot 95 therein having a widened central portion having generally cylindrical peripheral portions conforming to the rod 91 and having rectangular portions 97 extending upwardly and downwardly therefrom. The rod 91 has di-

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ametrically opposed operating plates 99 welded or otherwise secured to its outer end portion and extending upwardly and downwardly therefrom and has similar locking plates 100 spaced inwardly of the plates 99. When it is desired to release the dogs 90 from the notches 89 and accommodate the engagement and release of the latches 74 upon raising and lowering movement of the saddle 23, the rod 91 is pivoted to register the locking plates 100 with the slot 95 and moved outwardly to engage the plate portions 100 with the rectangular apertured portions 97 of the locking slot 95 and hold the latching dog in its released position. When it is desired to engage the dogs 90 with the notches 89, the plate portions 100 are moved through the slot 95 to position the plate portions 99 and 100 on opposite sides of said slot. The rod 91 may then be turned to bring the latching dog 90 into latching engagement with notch 89. The plate portions 99 and 100 on opposite sides of the web of the beam 48 will thereby lock the rod from rectilinear movement with respect to said beam as shown in FIGS. 9 and 15.

A simplified form of gravity operated latching arrangement has thus been provided which may be effectively used to raise and lower the freight container 10, by vertical raising and lowering movement of the saddle 23 and assure a positive latching of the saddle to the container and transferring the forces of lifting and lowering of the container to the bottom side beams of the container, and thereby avoiding buckling of the container when loaded.

While I have herein shown and described one form in which the invention may be embodied, it should be understood that various variations and modifications in the invention may be attained without departing from the spirit and scope of the novel concepts thereof.

I claim as my invention:

1. In a lifting apparatus and in combination with a container for freight and the like having latch keepers uniformly spaced along opposite sides thereof and accessible from the top of the container, said keepers comprising pins extending laterally of the container, a lifting saddle generally conforming to said container in plan and adapted to be suspended from and raised and lowered by a gantry and the like, latch means on said saddle adapted to have latching cooperation with said keepers, to effect lifting movement of said container upon vertical lifting movement of said saddle, said latch means comprising at least one latch associated with each keeper and eccentrically pivoted to said saddle and having strike noses biased by gravity to engage said keeper pins and cam said latches into locking engagement with said keeper pins upon lowering movement of said saddle, and releasable locking dogs carried by said saddle for locking said latches into latching engagement with said keepers.
2. The lifting apparatus of claim 1, wherein the keepers are adjacent the upper end portion of the container, and wherein means are provided connecting said keepers with the bottom of said container to transfer the lifting forces on said container to the bottom thereof.
3. The lifting apparatus of claim 2, wherein the means connecting the keepers to the bottom of the container to transfer the lifting forces to the bottom of the container comprises a flexible cable connected with the keeper and having lifting engagement with the container along the bottom thereof.
4. The lifting apparatus of claim 3, wherein the flexible cable is connected with the keeper adjacent the free ends of the cable, forming the cable into bight intermediate its ends, and wherein a sheave mounted on the container adjacent the bottom thereof engages the bight of said cable

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and has lifting connection with the bottom of the container.

5. In a lifting apparatus and in combination with a container for freight and the like having parallel side and end walls, having side and end beams extending about the bottoms of said side and end walls and connected thereto,

spaced vertical wells recessed in the side walls of said container and extending upwardly from the bottom thereof and opening to the top thereof,

keepers mounted in said wells and guided for limited vertical movement therealong,

flexible cables connecting said keepers with said beams to effect vertical lifting movement of the container upon vertical lifting movement of said keepers,

a lifting saddle generally conforming to said container in plan and adapted to be suspended from and raised and lowered by a gantry and the like, and latch means on said saddle adapted to have latching co-operation with said keepers, to effect lifting of said container upon vertical lifting movement of said saddle.

6. The lifting apparatus of claim 5, including box-like guides depending from said saddle for registry with said wells, each guide having a pair of latches transversely pivoted thereto and having latching engagement with an associated keeper and fluid pressure operated means for releasing said latches from said keepers.

7. The lifting apparatus of claim 6, including spring means mounted in said guides having operative association with said latches and biasing said latches to come into latching engagement with said associated keepers.

8. The lifting apparatus of claim 6, wherein the fluid pressure operated means are double acting and are effective to engage and release said latches from said keepers.

9. The lifting apparatus of claim 5, wherein the keepers extend laterally through said side walls and are vertically moveable with respect thereto, and wherein said latches are eccentrically pivoted and have

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strike noses biased by gravity to have camming engagement with said keepers, camming said latches into latching engagement with said keepers upon lowering movement of said saddle.

10. The lifting apparatus of claim 9, wherein manually operable locking means are provided and have operative engagement with said latches to lock said latches in their locking positions, and to release said latches for free pivotal movement with respect to said saddle, and wherein other locking means are provided to hold said locking means from releasing said latches when in locking engagement with said keepers.

11. A container for freight and the like having parallel side and end walls and reinforcing beams extending about the bottoms thereof providing a rigid base framework for said container,

uniformly spaced wells spaced inwardly of said end walls equal distances and recessed in said side walls and extending vertically therealong,

a keeper guided in each well, means supporting said keepers above the bottoms of said wells,

flexible cables connecting said keepers with said beams to exert a lifting action thereof upon vertical lifting movement of said keepers, and transmitting lifting forces on said keepers to said beams.

12. The freight container of claim 11, wherein the keepers comprise pins extending laterally through said side walls and mounted for limited vertical movement along said side walls.

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