Aug. 28, 1962 J. E. GUTRIDGE 3,051,098

APPARATUS FOR HANDLING FREIGHT

Filed Nov. 10, 1958 5 Sheets-Sheet 1

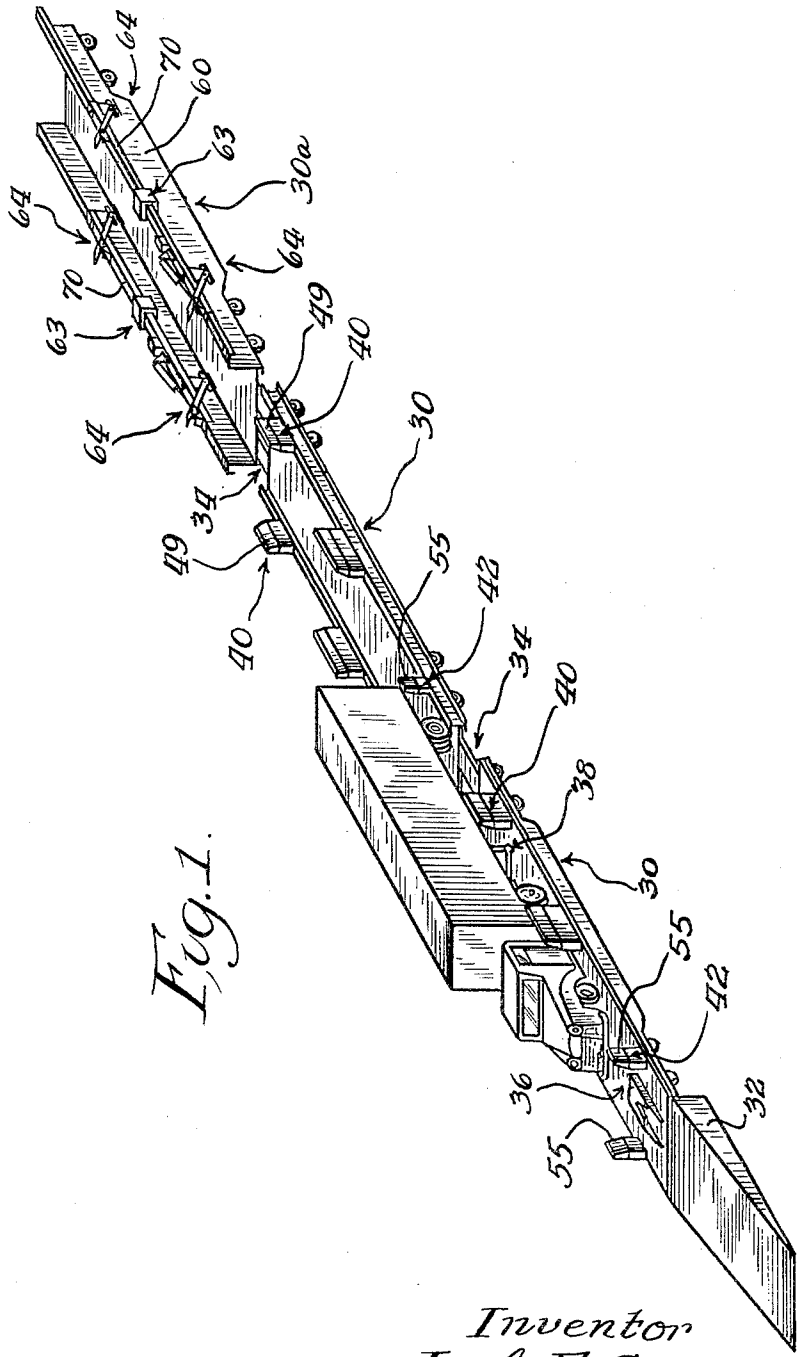


Fig. 1.

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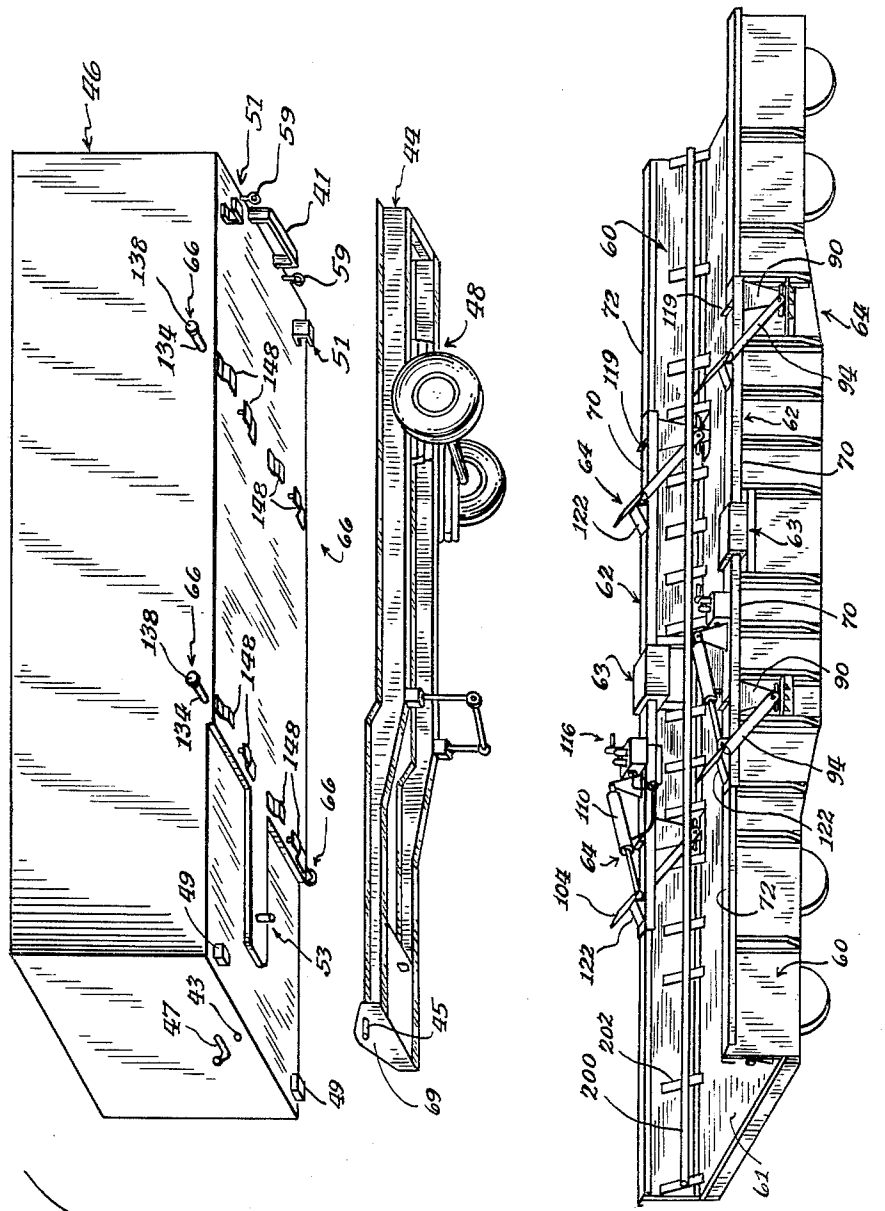


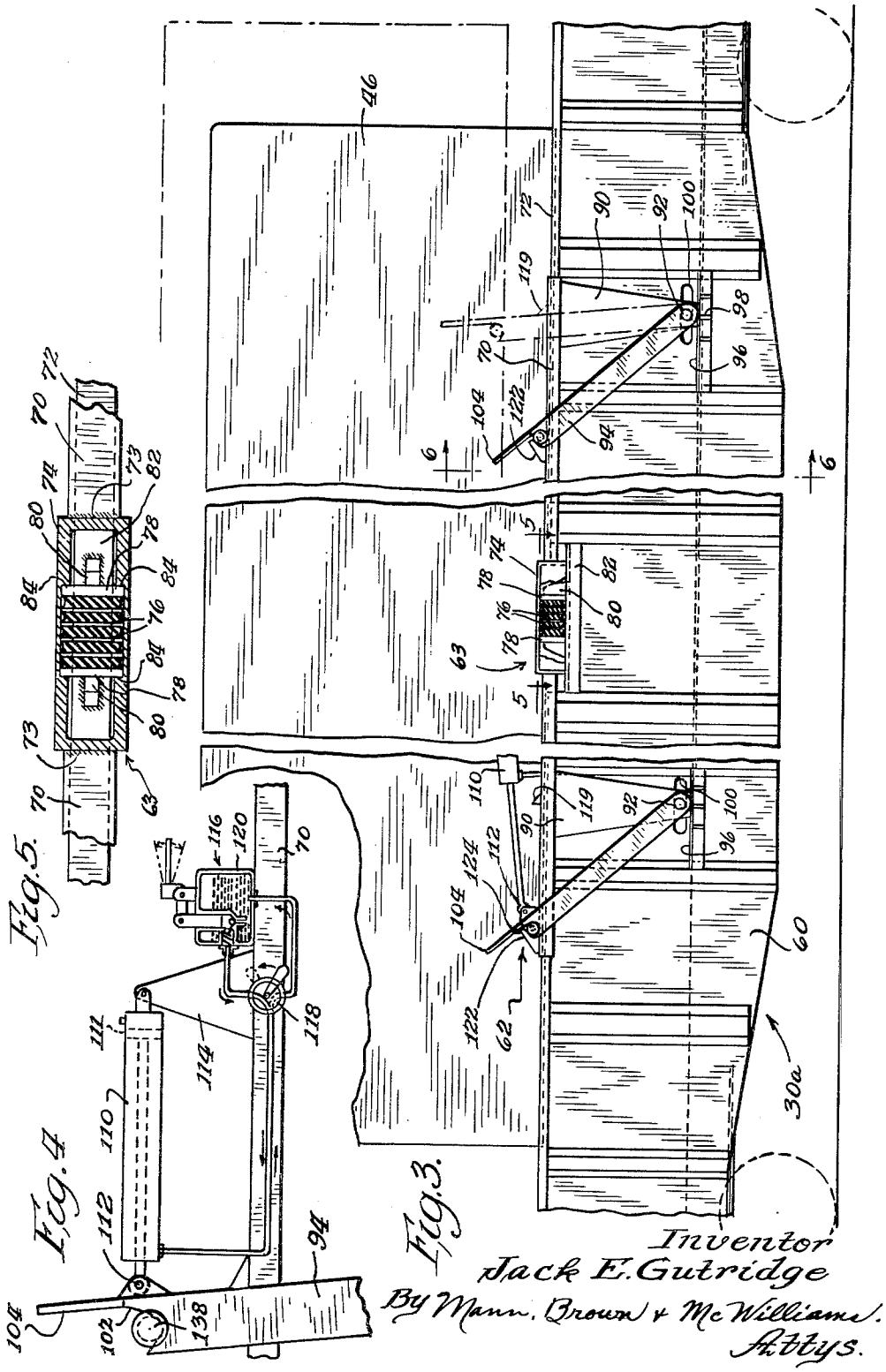
Fig. 2.

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APPARATUS FOR HANDLING FREIGHT

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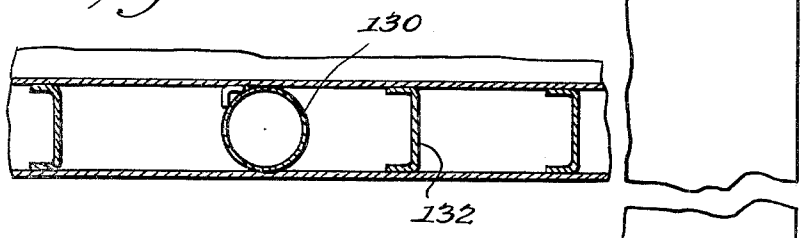


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APPARATUS FOR HANDLING FREIGHT

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Fig. 8.



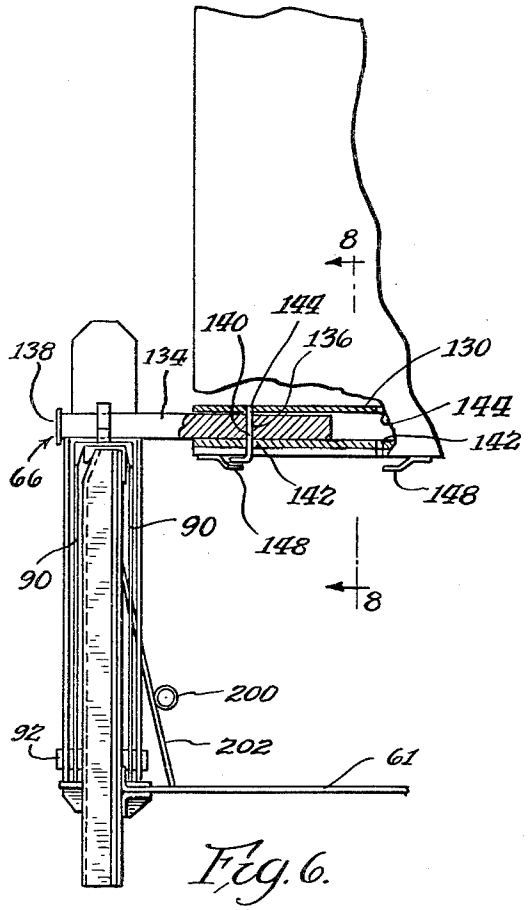


Fig. 6.

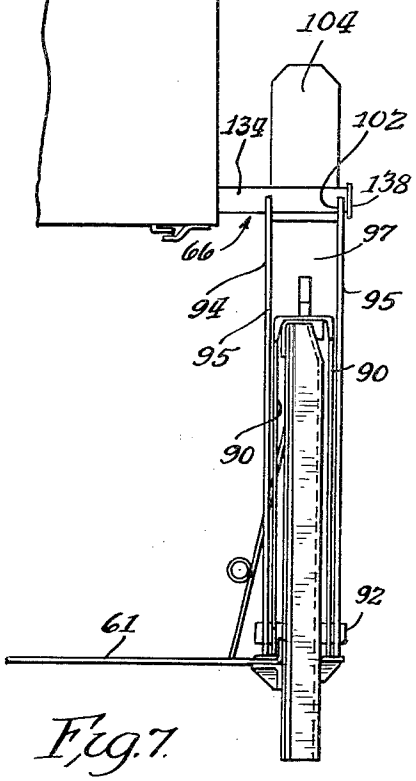


Fig. 7.

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5 Sheets-Sheet 5

Fig. 11.

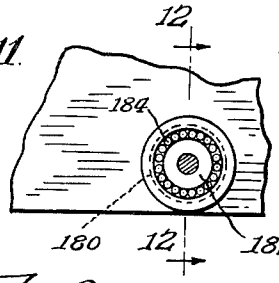


Fig. 12.

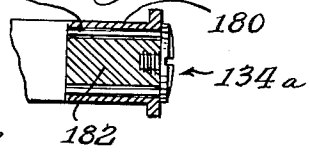


Fig. 10.

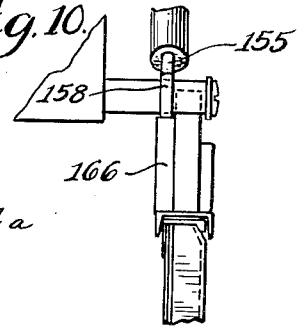
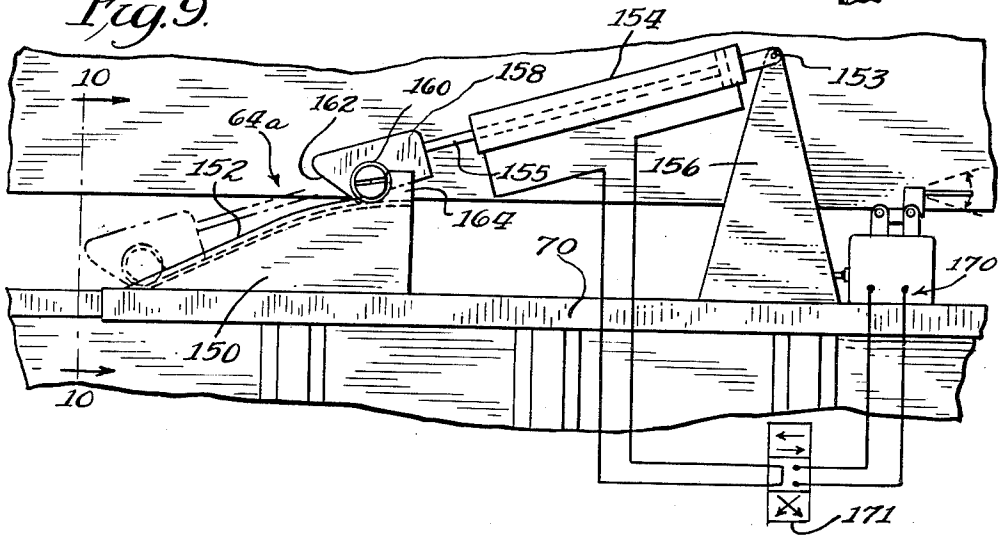


Fig. 9.



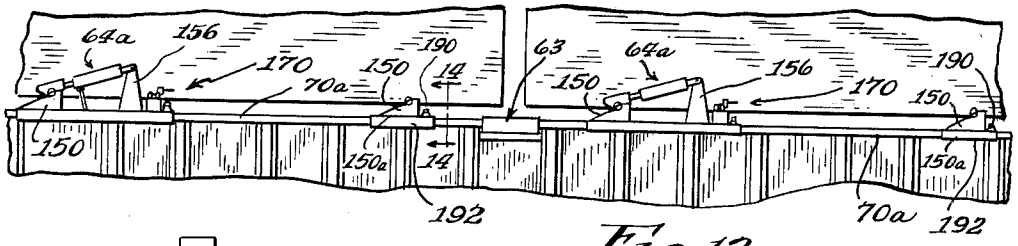
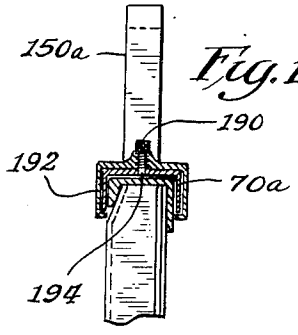


Fig. 13.

Fig. 14.



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United States Patent Office

3,051,098
Patented Aug. 28, 1962

3,051,098
APPARATUS FOR HANDLING FREIGHT

Jack E. Gutridge, Dyer, Ind., assignor to Pullman Incorporated, a corporation of Delaware

Filed Nov. 10, 1958, Ser. No. 772,819
19 Claims. (Cl. 105—368)

In United States patent application, Serial No. 699,759, filed November 29, 1957, in the names of Jack E. Gutridge and William R. Hummel, for improvements in Highway-Railway Transportation System and Apparatus, there is disclosed a system for handling freight in such manner that many economies are effected in transporting the freight in marine, railway and highway travel and various combinations thereof. Many important aspects of the present invention are disclosed in said application Serial No. 699,759, and for that reason, the entire disclosure of that application is hereby incorporated by reference to the extent that it is not inconsistent with the present disclosure.

In the prior application referred to, one of the important concepts disclosed concerns the use of a truck or semi-trailer chassis which can readily be detached from the container carrying the freight load, and in one use of the system the truck or semi-trailer chassis carrying the container is backed onto a railway car provided with lateral supports at approximately the height of the container bottom and engageable therewith, and separation of the container from the truck or semi-trailer chassis is effected through the use of an air spring rear suspension, which includes controls for collapsing the air spring to allow the weight of the container to rest upon the railway car supports, whereupon the truck or semi-trailer chassis can be pulled from beneath the container.

The railway car is equipped with a fifth wheel stand engageable with a kingpin provided on the semi-trailer container to lift the front end of the container from the front supports of the railway car and to carry the front end of the container load.

One of the outstanding advantages of the freight transportation system disclosed in said prior application is its compatibility with various freight transportation systems now in use in this country or being offered for use as a solution to obtaining greater economies in freight transportation.

The present invention maintains all or substantially all of the advantages inherent in the freight transportation system disclosed in said prior application, but provides a different means for loading and supporting a freight container or a plurality of containers on the railway car, and with certain advantages.

One such advantage is that in the present invention the fifth wheel stand on the railway car is dispensed with, with resulting savings in cost, except, of course, when a railway car presently used in piggyback service is already equipped with a fifth wheel stand.

Further and other objects and advantages include the following:

The invention lends itself advantageously to gondola-type cars, and with this type of car great flexibility is achieved in the number of containers which may be supported on a single car due to the gondola sides being approximately at the height at which the container loads are to be supported; the use of air springs in the rear suspension of the truck or semi-trailer is made unnecessary, because the truck tractor is used to provide the motive power for effecting separation of the container from the chassis; it is a simple matter to lower the containers from a few inches to even greater distances in order to lower the center of gravity of the containers with respect to the railway car and to stay within railroad clearance lines; and the elevatable fifth wheel stand commonly provided on the truck tractor may be used advantageously in transferring the container load to the railway car by proper manipulation in order to maintain tractive power on the tractor while the container is being separated from the chassis.

It should be understood that the separation means herein disclosed for effecting separation of the container from the truck or semi-trailer is equally useful at loading platforms, shippers' docks, warehouse storage areas, etc., as well as on railway cars. It should be further understood that, while standard side gondola cars are preferable for installing the apparatus of this invention and in conjunction with its use in the system, other types of railway cars may be used, as, for example, flatcars.

Further and other objects and advantages of the invention will be apparent as the disclosure proceeds and the description is read in conjunction with the accompanying drawings.

In the drawings:

FIGURE 1 is similar to FIGURE 1 of the above identified application and illustrates a plurality of railroad cars of different types suitable for use with the system disclosed in said application together with a railroad car arranged in accordance with the present invention, a truck tractor and semi-trailer shown backing into loaded position;

FIGURE 2 is an exploded perspective view of the railway car of the present invention and the separable semi-trailer chassis and freight container of the invention described in said copending application, as modified in accordance with the principles of my present invention;

FIGURE 3 is an enlarged side elevational view of the railroad car of FIGURE 2, showing the container applied thereto for transit, with parts broken away;

FIGURE 4 is an enlarged diagrammatic side elevational view of a portion of one of the container lift devices provided in accordance with my invention together with suitable apparatus for actuating same;

FIGURE 5 is a diagrammatic fragmental cross-sectional view along line 5—5 of FIGURE 3, illustrating the principal features of a suitable cushioning device for the container when mounted on the railroad car;

FIGURE 6 is a fragmental transverse cross-sectional view of the container and railway car, substantially along line 6—6 of FIGURE 3;

FIGURE 7 is a view similar to that of FIGURE 6, but illustrating the other side of the railroad car and container and showing the container in elevated position;

FIGURE 8 is a fragmental diagrammatic cross-sectional view of a portion of the floor of the container, taken approximately along line 8—8 of FIGURE 6;

FIGURE 9 is a fragmental view similar to that of FIGURE 4, but illustrating a modified form of the invention employing cam elements instead of rocker-type lifts;

FIGURE 10 is a fragmental cross-sectional view approximately along line 10—10 of FIGURE 9;

FIGURE 11 is an enlarged elevational view of one of the retractable support members carried by the container of the embodiment of FIGURE 9;

FIGURE 12 is a fragmental diagrammatic cross-sectional view approximately along line 12—12 of FIGURE 11;

FIGURE 13 is a diagrammatic view similar in nature to that of FIGURE 3, but illustrating a further modified form of the invention; and

FIGURE 14 is a diagrammatic fragmental cross-sectional view approximately along line 14—14 of FIGURE 13.

It should be understood that the specific disclosure which follows is for the purpose of complying with section 112 of title 35 of the U.S. code, and that the

appended claims should be construed as broadly as the prior art will permit consistent with the disclosure herein made.

General Description

Referring first to FIGURES 1 and 2, and as described in said copending application, the shipping yard facilities provided for placing the system of the said copending application in operation may include a single track upon which a number of flatcars or other special cars are positioned in coupled relation, these cars being generally designated **30** in FIGURE 1.

At the end of the track is a ramp **32**, and interconnecting adjacent cars are retractable sills generally designated **34**.

Each of the cars **30** is essentially a flatcar, so that a truck or semi-trailer may be moved across its deck; but the cars may be, in some instances, modified gondola cars, flatcars with a special type of side frame, or other special cars particularly suited for their intended usage. Every car which is to be used for piggyback service is provided with a fifth wheel stand generally designated **36** and this is used to support the fifth wheel pin of the semi-trailer.

Conventional practice is for the truck tractor with its semi-trailer to back up the ramp **32**, and from car to car over the sills **34** to the last car in the series, whereupon the truck tractor is disconnected in the usual manner, allowing the front of the semi-trailer to rest upon its landing wheels **38**, after which the truck tractor is driven off the cars, and the front of the semi-trailer is picked up by the fifth wheel stand **36** to support the front end of the trailer during travel of the railway car.

In order to make the cars **30** alternatively usable with the novel system of said copending application, retractable shelves or load supports are provided at the rear of each car on opposite sides thereof, these being generally designated **40**. Similar retractable supports **42** are provided near the front end of the cars, and both front and rear supports **42** and **40**, when in their retracted positions (of FIGURE 1), permit piggyback operation in a conventional manner.

The preferred special type of semi-trailer used in the improved system of said application combines a freight or load container **46** (see FIGURE 2) mounted upon a special trailer chassis **44**. The container body **46** is a completely rigid structure, and does not require the trailer chassis **44** to enable it to be supported at opposite sides of its rear end and opposite sides of its front end, or at the center of the front end. The trailer chassis **44** is preferably supported on its wheeled axles by air springs **48**, for reason which will be later explained, though in alternate arrangements disclosed in said copending application, standard mechanical springs may be employed.

The truck tractor for the semi-trailer **44** and **46** just described is preferably provided with a conventional hydraulic mechanism or the like for changing the elevation of the fifth wheel with respect to the ground, as this is a considerable convenience in the use of the equipment in the system of said copending application.

As described in said application, the container **46** may be provided with U-shaped member **41** into which the rear end of chassis **44** slides, a recess **43** at the front end of the container adapted to receive locking pin **45** carried by chassis **44**, and rotatable lock **47** adapted to be positioned to prevent withdrawal of pin **45**. Container **46** also includes blocks **49** that actually contact retractable brackets **42**.

When the special trailer of said system of said copending application is to be transferred to a railway car, the trailer is backed onto the cars **30**, using the motive power of the coupled truck tractor in exactly the same manner as in the piggyback system, with the front and rear supports **42** and **40** of the cars, through which the unit must pass in reaching the car **30** for loading, being retracted to permit free transit. The car **30** which is to

be loaded has the upper segments **49** of its rear supports in operative position; that is, in horizontal position (extending toward each other); and, as the trailer is backed onto this car, guide members or brackets **51** (see FIGURE 2) on opposite sides of the rear end of the trailer container coact with the rear supports **40** to center the rear of the trailer over the car end and place the rear end of the trailer on these supports. The trailer is moved back on these supports a sufficient distance so that the front end of the trailer clears the front supports **42**, after which the upper segments **55** of the front supports **42** are moved to their operative horizontal positions, the lift mechanism for the fifth wheel plate of the tractor is raised, and the trailer is moved forward by the tractor until the front end of the trailer body or container is located above the front supports **42**. The rear supports are of sufficient length longitudinally of the car so that the forward movement of the trailer over the front supports **42** will not disengage the rear supports **40** from the rear end of the trailer. Thereupon, the fifth wheel plate of the tractor is lowered to permit the trailer body to rest upon the upper segments **55** of front supports **42**, and simultaneously, or subsequently, the air is let out of the air springs **48** in order to have the rear support **40** support the load of the trailer body.

The lowering of the fifth wheel plate of the tractor and the removal of air from the air spring system enables the trailer chassis **44**, after the release of suitable locking mechanism, to be pulled out from beneath the container **46**, and the truck and trailer may be driven off the car and used for other service.

The container **46** is provided with a kingpin **53** that is properly located with respect to the fifth wheel stand on the railway car, and the latter is raised into engagement with the kingpin and beyond, so that the front end of the trailer body is then supported on the fifth wheel stand rather than upon the front supports **42**.

For unloading, a reverse sequence of steps is followed.

FIGURES 1 and 2 illustrate a special car **30*a***, arranged in accordance with the principles of my present invention, as it may be used in association with the apparatus shown in FIGURES 1 and 2.

The special car **30*a*** comprises in the illustrated embodiment, an open ended gondola-type car formed with a flat floor or bed **61** and side wall structures **60** that each carry a sliding support **62** cushioned against buff and draft shocks by cushioning devices **63**. The floor or bed **61** and structures **60** may be formed in any suitable manner consistent with the objects of the invention. In the embodiments of FIGURES 1–12, the supports **62** each carry a pair of spaced container lift devices **64** (embodiment of FIGURES 2–8) or **64*a*** (first embodiment of FIGURES 9–14), each of which includes mechanical advantage lifting means spaced to cooperate with a separate extensible rigid support member **66** carried by the container **46**.

To load the car **30*a*** with a container **46** separably carried by chassis **44** and provided with the support members **66**, the chassis **44** (carrying the container with support members **66** retracted) is backed, for instance, through cars **30** onto the left hand end of car **30*a***, as the car is illustrated in FIGURES 1 and 2, the container then being positioned so that the support members **66** are somewhat in front of the individual container lift devices **64** or **64*a***. The container support members **66** are then extended so that they will extend in front of the container lift devices and over the side wall structures of the car (see FIGURES 6 and 7) and the container is disconnected from the chassis to permit separation of the two. Then the backing action of the trailer tractor is continued to move the support members **66** against the respective container lift devices; and employing the motive power of the trailer tractor, the vehicle is lifted or swung up approximately to the broken line positions of FIGURE 3. Upstanding flange **69** of the chassis **44** is made sufficiently high to overlap the front end of the container even when held

at its maximum height by the container lift devices, so that the backing action of the tractor is transmitted to the container to effect completely the desired elevation of the container.

This is effective to lift the container far enough, and to take enough weight of the container off the chassis to permit the chassis to be removed from underneath the container by the tractor trailer, the chassis being moved away from the container in the usual manner. The container lift devices 64 and 64*a* are arranged to hold the container in elevated position until the tractor trailer 44 has been removed, whereupon the container is lowered until the support members 66 are supported by the side wall structures of the car. The container when supported by the wall structures of the car is substantially lower than when supported in the normal way by the trailer chassis.

When it is desired to unload the container 46 from car 30*a*, the container lift devices are actuated to lift the container sufficiently high so that a chassis 44 may be moved underneath it; the container lift devices are then actuated to lower the container towards chassis 44, the flange 69 of the chassis serving as a stop against which the container abuts for properly locating the container with respect to the chassis. The tractor driver releases the tractor and chassis brakes on contact between chassis flange 69 and the front end of the container, which permits a moving forward of the tractor, chassis and container, but keeps the container properly associated with the chassis for application of suitable latching devices (such as those shown in FIGURE 2) to ready the container and chassis for highway travel. When the container has been fully lowered onto the chassis 44, the container support members 66 are released from the action of the container lift devices 64 or 64*a*, whereupon the forward motive movement of the trailer tractor is employed to withdraw the container from the railroad car, after support members 66 have been fully retracted and the container latched to the chassis.

Of course, the chassis 44 is appropriately positioned with respect to the railroad car container lift devices 64 or 64*a* prior to container loading and unloading operation to allow for the necessary movement of the container longitudinally of the car and correct indexing to insure proper association of the container member 41 with chassis 44. Parenthetically, it may be mentioned that container 41 is shown for descriptive purposes only and may be eliminated in favor of a different type of latching device, which may be of any conventional type, if found to be necessary or desirable. For instance, suitable pins (not shown) may be applied between container eyes 59 (see FIGURE 2) and the rear end of the chassis.

It will be immediately apparent that my invention eliminates the need for air springs 48 as well as the fifth wheel stand 36. Thus, standard mechanical springs may be employed in the form of chassis 44 that is employed in practicing my invention. Moreover, the container is provided with a cushioned support on the side wall structures of the railroad car, which means that it is positioned to provide maximum overhead clearance and is protected against buff and draft impacts.

SPECIFIC DESCRIPTION

Referring now to the specific embodiment of FIGURES 3–8, which also illustrate structural features common to those of the other embodiments, the railroad car sliding supports 62 each include a pair of sliding channel-shaped members 70 which are received over the railing structure 72 of the railroad car side wall structure 60. Each channel member 70 is fixed, as by welding at 73, to housing 74 of the cushioning device 63 that is carried by a support 62, the housing 74 enclosing a plurality of conventional rubber-like compression pads 76 interposed between spaced followers 78 which in turn are engaged by spaced lugs 80 that are fixed to transverse framing member 82 of the railroad car side wall structure (the railing structure 72 being interrupted to accommodate lugs 80). The housing 74 at its sides is formed with shoulders 84 that engage the respective followers 78.

The channel members 70 adjacent the opposed ends thereof in the embodiment of FIGURES 3–8, carry a pair of spaced depending hanger plates 90 which are positioned on either side of the wall structure 60 (see FIGURES 6 and 7). The pairs of plates 90 at their lower ends each carry a pin 92 which pivotally mounts a rocker arm or lever 94 for pivotal movement between the positions indicated in FIGURE 3. The illustrated levers 94 each comprise spaced plates 95 received on each side of the car wall structure and joined at their ends by web 97; plates 95 are suitably formed to receive the respective pins 92. The lower ends of the respective pairs of plates 90 ride on, or cam on, wear plates 96 suitably secured to transverse members 98 of the car side wall structures 60. The side wall structures may be slotted as at 100 to permit the movement of pins 92 longitudinally of the car that is provided by the cushioning devices. Pins 92 may be held in position by suitable cotter pins, nuts or the like (not shown).

The arms or levers 94 are each formed with a seat 102 that receives a container support member 66, plates 96 being suitably notched at their upper ends for this purpose. The levers may be formed with upwardly projecting catch extensions 104, comprising extensions of webs 97, to insure that the container support members 66, when extended, engage the levers regardless of how high the container is riding on its chassis 44.

As indicated in FIGURE 4, the forward arm or lever 94 of each container support 62 is secured to a suitable power applying device, such as a fluid actuated cylinder 110, that comprises jack means for raising and lowering the container. The cylinder 110 is illustrated in the form of a single acting hydraulic device, which is pivotally secured to the respective levers 94 as at 112 and to a suitable pillar or other support 114 that is carried by the respective supports 62. Also mounted on the respective supports 62 is a suitable hydraulic pump 116 which may be of any suitable design and which supplies hydraulic liquid to the left hand end of cylinder 110, in the showing of FIGURE 4, when the valve 118 is in the solid line position; when the valve 118 is in the broken line position, the weight of the container on the arms or levers 94, when the chassis has been removed, or those handling the container in removing same by pressing on the levers, return the hydraulic liquid to the tank 120 that is associated with the appropriate pump 116. When the container is initially swung up on levers 94, the valve 118 is positioned in the broken line position so that the pistons 111 of hydraulic cylinders 110 will draw hydraulic liquid into these devices under the motive power of the trailer tractor.

The respective channels 70 preferably carry arms or lever stops 119 of any suitable design to prevent the respective arms or levers 94 from being swung (to the right of FIGURE 3) past a vertical position; preferably, the stops 119 are disposed so that levers or arms 94 do not quite reach a vertical position.

As best shown in FIGURE 3, the sliding channels 70 each carry a lug 122 that is positioned in front of the adjacent lever 94 in its lowermost position. The lugs 122 include rearwardly projecting ends 124 that extend over the respective container support members 66 when the container is supported by the side wall structure of the car. The container 46 when carried by chassis 44 will ride sufficiently high, or container support members 66 are so positioned with respect to the container, that members 66 pass over lugs 122 when the container is applied to and withdrawn from the car 30*a*.

As indicated in FIGURES 6–8, the container support devices 66 each comprise a rigid tubular member 130 formed from wear-resisting suitable materials and secured to the container at each end thereof along and entirely

across its bottom portion. The tubular members 130 preferably respectively replace one of the conventional transversely extending cross bearers 132 of the bottom structure of the container at each end thereof and are rigidly secured in place within the floor structure of the container to serve the purpose of the cross bearers they replace. This may be done in any suitable manner.

The tubular members 130 at each end thereof each receive a rigid rod-like member 134 formed with a transverse bore 136 and a flanged head 138. The rod-like members 134 are preferably each approximately equal to one-half the length of the tubular member 130 in which they are received and in the retracted position their heads 138 are preferably aligned with the side wall structure of the container with their inner ends substantially abutting within the center portion of the respective tubes 130. The heads 138 are flanged to prevent lateral movement when rod-like members 134 engage the container lift devices.

An appropriate latch bar 140 may be provided to hold the respective members 134 in extended or retracted positions, the latches 140 cooperating with perforations 142 and 144 formed in the lower portion of the container. Resilient supporting plates 148 having approximately the configurations shown in FIGURES 2 and 6, may be mounted underneath the perforations 142 to hold the latch members 140 in latching position, as in the manner indicated in FIGURE 6. Any other suitable latching arrangement for the rods 134 may be employed, as desired or necessary.

The rods 134 when moved against the levers or arms 94 during the transfer of the container from the chassis ride above lugs 122 and engage extensions 104 to start the lever arms pivoting upwardly about pins 92. Further movement to the right of FIGURE 3, or rearwardly of the car 30*a*, brings notches 102 of plates 95 into engagement with the respective rods 134, which starts the lifting action on the container. The container is moved to the right of FIGURE 3 sufficiently to raise it from one to three inches, which ordinarily will take enough of the container weight off the chassis to permit the latter's removal. After removal of the chassis, the container is permitted to swing down into engagement with the channels 70 and their lugs 122, hydraulic valve 118 being appropriately positioned for these operations to permit the necessary flow of hydraulic liquid.

When the container is to be removed from the car, the hydraulic pumps 116 are simultaneously acuated to swing levers 94 toward the vertical position so that the container will be positioned at a sufficient height to receive the chassis 44. After the chassis is positioned under the container, the container lift devices are actuated as already described to swing the levers or arms back to the left of FIGURE 3 to restore the full weight of the container to the chassis. Valve 118 is suitably positioned to permit this movement as well as to permit the levers 94 to be pushed down into engagement with channel 70, by the container handlers, until the levers are again needed.

In both the application of the container to the car, and its removal therefrom, the trailer tractor fifth wheel elevating device may be employed to apply a sufficient upwardly directed force on the front end of the container to give the tractor the traction it needs to accomplish movement of the chassis with respect to the container. This also applies to the other embodiments of the invention.

In the embodiments of FIGURES 9–12, the channel members 70 each carry a pair of cam members 150 that are provided with cam surfaces 152 shaped to provide the lifting action effected by levers 94. In this embodiment of the invention, the single acting cylinders 110 are replaced by a double acting hydraulic cylinder 154, which in the case of the forward cam members 150, are pivotally secured, as at 153, to an appropriate pillar or other suitable support 156 carried by the respective channels 70. The piston rods 155 of cylinders 154 each carry a gripping head 158 formed with a downwardly opening seat 160 that is proportioned to receive the adjacent end 134*a* of container support member 66 in its extended position. The gripping heads 158 are provided with a cam surface 162 that is initially engaged by the container support member 66 as the container is being moved rearwardly of the car, or to the right of FIGURE 9, by the trailer tractor acting on chassis 44. The surface 162 of each container lift device 64*a* serves as a catch and a cam for engaging the supports 66 of the container and camming the respective heads 158 upwardly to drop them about said supports 66 as the container is moved rearwardly of the car. By the time the supports 66 of the container engage against upwardly extending lugs 164 of the respective cam devices 150, the gripping heads 158 are positioned with respect to the container support member 66 approximately as shown in FIGURE 9.

Preferably, the cam members 150 on their inner surfaces carry a flange or shelf 166 (see FIGURE 10) on which the respective heads 158 ride and which have the configuration of the cam surface 152 so that the gripping head 158 of each cam lift device 64*a* will ride along the same path of movement that is defined by the respective cam surfaces 152, when it is not received about a rod 134*a*.

The hydraulic cylinders 154 may be operated and controlled by an appropriate pump 170, which is merely illustrative of the usual equipment accompanying hydraulic mechanisms of this type, and may supply hydraulic liquid to the cylinders through appropriate apparatus such as four-way control valve 171 and suitable conduiting interconnecting the respective pumps and cylinders. Of course, the cylinders on both sides of the car may be actuated by a single pump and valve 171 where appropriate conduiting and apparatus is provided for this; this applies to all illustrated and contemplated forms of the invention.

In the embodiment of FIGURES 9–12, the container supports 66 preferably include the modified rod-like members 134*a* (see FIGURES 11 and 12) which include the flanged rolling member 180 journalled on appropriate core structure 182 by an appropriate form of bearing unit which may include spaced rollers or anti-friction elements 184. Core structures 182 otherwise correspond to members 134 of FIGURE 3–8.

When a chassis 44 carrying a container provided with rods 134*a* is moved, with the rods 134*a* extended, by a trailer tractor toward cam surfaces 152, roller members 180 engage and move up surfaces 152 to lift the container upwardly; of course, valves 171 are first positioned to permit the necessary hydraulic liquid flow to and from cylinder 154. By the time the roller members 180 engage lugs 164, the containers have been raised sufficiently to permit the chassis to be removed from under the container. Also, the heads 158, which may have been initially, but not necessarily, moved to approximately the full line position of FIGURE 9, will have dropped down about rods 134*a* engaging same (heads 158 should be positioned so that their surfaces 162 will be engaged by container supports 66 regardless of how high the container is riding on its chassis). The chassis is then removed, the controlling valve 171 of hydraulic mechanism 170 being positioned to prohibit hydraulic flow, which holds piston rods 155 against withdrawal from their cylinders and restrains the containers from being drawn down surfaces 152 of the cams by any friction occurring between the chassis and the container. After removal of the chassis, the hydraulic pump is actuated to start the roller members 180 rolling down the cam surfaces 152 and permit further lowering in a controlled manner, until they rest on the channels 70.

When the container is to be removed from the car, the hydraulic mechanisms 170 are actuated to roll the rods 134*a* up surfaces 152 to the solid line position of FIGURE 9. The chassis is then backed under the container,

and the pump 170 actuated to lower the container onto the chassis and against chassis flange 69. When the chassis has been fully lowered, the heads 158 are lifted from rods 134*a*, whereupon the chassis may be moved forwardly and off the car, carrying the container.

In the embodiment of FIGURES 13 and 14, the channel members 70*a* are made relatively long and each carries a set of container lift devices 64*a* and cam members 150 and 150*a*. The cam members of each set marked 150*a* are preferably arranged for adjustment longitudinally of the respective channel members 70*a* in the manner indicated in FIGURE 14, which illustrates a spring pressed detent 190, carried by the channel 192 to which the cam member 150*a* is secured, which may be received in one of a plurality of holes 194 formed along the length of the channel member 70*a*. This arrangement permits the handling of containers 46 of various lengths by the same car.

As illustrated best in FIGURE 2, the railroad car 30*a* may include a guard rail 200 on each side thereof to serve as a guide for the tractor and trailer chassis wheels. The guard rails 200 may be secured to appropriate stiffening components 202 that extend between the side wall structures and floor of the car.

In the embodiment of FIGURE 9, the container lift device includes the double acting cylinder 154 so that the container when elevated for removal from a chassis may be pushed to start it moving downwardly (after the chassis is removed) and then lower it in a controlled manner. The container may be locked in lowered or any other position by merely closing off the hydraulic circuiting by the appropriate controlling valve. It will be noted that the axial center of seat 160 is below the axis of piston rod 165, which insures that a downward holding component of force is applied to each container support 66 so long as hydraulic liquid is acting on the piston of the cylinder 154.

The railroad car illustrated is of the drop end gondola type, and this is preferred, as its end posts are designed for heavy loads and may be adapted for use in accordance with my invention by removing the hinged ends. However, other types of railroad cars having appropriate side wall or side railing structures will be satisfactory.

In a specific embodiment of the invention, containers 8 feet wide, 8 feet three inches high and 35 feet long are arranged to be carried on a car such as that herein described. With these dimensions, the top of the container stands at approximately 16 feet above the track rails when the container rests on its chassis 44. The container lift devices lift or move the container upwardly with respect to the chassis only from one to three inches, as is necessary to take sufficient weight off the chassis springs to permit removal of the chassis. When the container rests on the side rail structures of the railroad car, its top is approximately 15 feet 3 inches above the track rails, the container lift devices raising and lowering the container between its positions of maximum and minimum height. A container of these dimensions when loaded will weigh approximately 16,000 pounds and the individual container lift devices will carry approximately 15,000 pounds each. The container lift devices may be arranged to accommodate containers of lengths from 17 to 40 feet, depending on the length of the railroad car employed and how many containers are to be carried by the car.

ADVANTAGES OF INVENTION

My invention has a number of important advantages. For instance, the cushioning devices 63 provide a cushioning action on loading of the container as well as during transportation thereof. The illustrated device 63, which is merely illustrative of numerous types of specific cushioning devices that could be employed, will provide a cushioning action of about eight inches in either direction, but a cushioned movement on the order of thirty inches is contemplated by appropriately designing the cushioning device.

The container supports being cushioned, the positions of the respective container lift devices longitudinally of the car may be varied at will. Moreover, the frictional engagement of the sliding channels of the container supports with the side rails of the car materially increases the capacity of the cushioning effect provided by devices 63 or their equivalents.

Hoisting equipment of an expensive type is rendered unnecessary because of the use of the motive power of the trailer tractor and the short lift that is required to move the containers beween the necessary lowered and elevated positions.

The container in its mounted position on the car is relatively low in spite of the fact that it rides above the car floor a considerable amount. The top of a container of the above specified dimensions will ride well below the top of a semi-trailer carried piggyback fashion.

The container lift devices need only be strong enough to raise and lower a fully loaded container, as during transit the lift devices are unloaded.

The foregoing description and the drawings are given merely to explain and illustrate my invention and the invention is not to be limited thereto except insofar as the appended claims are so limited, since those skilled in the art who have my disclosure before them will be able to make modifications and variations therein without departing from the scope of the invention.

I claim:

1. Apparatus for transporting freight comprising a railroad car formed with upstanding side wall structures, a container support movably mounted on each side wall structure, cushioning means interposed between each container support and the side wall structure on which it is carried, a container adapted to be mounted between and carried by said supports, said container carrying laterally extensible rigid support members on either side thereof engageable with said supports, respectively, a chassis adapted to be separably connected to said container, said supports each including means for raising and lowering the container with respect to said chassis, and means for backing said chassis onto the car and for drawing the chassis away therefrom, whereby, said chassis with the container carried thereby may be backed onto the car, said container may be lifted upwardly to take a substantial portion of the weight of the container off the chassis to permit removal of the chassis, and after removal of the chassis the container may be lowered to a transporting position of minimum height.

2. Apparatus for transporting freight comprising a railroad car formed with upstanding side rail structures, a container support slidably mounted on each side rail structure, cushioning means interposed between each container support and the side rail structure on which it is carried, a container adapted to be mounted between and carried by said supports, said container carrying laterally extensible rigid support members on either side thereof engageable with said supports, respectively, a chassis adapted to be separably connected to said container, said supports each including means for raising and lowering the container with respect to said car when said container is engaged with said chassis, the last mentioned means including leverage means rendered effective on movement of the container in one direction longitudinally of the car to raise same with respect to the chassis, and to lower same on movement in the opposite direction, and means for backing said chassis onto the car and for drawing the chassis away therefrom, whereby, said chassis with the container carried thereby may be backed onto the car, said container may be lifted with respect to the car to lift a substantial portion of its weight from the chassis during the backing movement thereof to permit separation of the two for removal of the chassis, and after removal of the chassis the container

may be lowered to a transporting position of minimum height.

3. Apparatus for transporting freight comprising a railroad car formed with upstanding side rail structures, a container support slidably mounted on each side rail structure, cushioning means interposed between each container support and the side rail structure on which it is mounted, a container adapted to be mounted between and carried by said supports, said container carrying laterally extensible rigid support members on either side thereof engageable with said supports, means for locking said support members in extended position, said supports each including a lever secured at one end thereof to the support for pivotal movement about an axis that extends generally transversely of the car and is positioned substantially below the top of the railing structure, means for moving said levers between a substantially vertical position and an inclined position in which the levers extending generally in the direction from which the container is to be loaded onto the car, each of said levers being formed with a seat on the other end thereof to receive the respective rigid support members of said container, a chassis adapted to be separably connected to said container, and means for backing said chassis onto the car and for drawing the chassis away from the car, whereby, said chassis with the container carried thereby may be backed onto the car by bringing said rigid members, when extended, into engagement with the respective lever seats, and on further backing said levers are rocked toward their vertical positions to lift a substantial portion of the weight of said container from said chassis to permit withdrawal of the chassis, whereupon the said means for moving said levers may be actuated to lower said support members onto the respective supports.

4. Apparatus for transporting freight comprising a railroad car formed with upstanding side rail structures, an elongate container support slidably mounted on each side rail structure, cushioning means interposed between each container support and the side rail structure on which it is mounted, a container adapted to be mounted between and carried by said supports, said container carrying a pair of laterally extensible rigid support members on each side thereof engageable with said supports, means for locking said support members in extending position, said supports each including a pair of upwardly extending levers each secured thereto adjacent one end thereof for pivotal movement about an axis that extends generally transversely of the car and is positioned substantially below the top of the railing structure, said levers of each suppport being spaced for engagement with the pair of support members to be carried by the support, power means for moving said levers between a substantially vertical position and an inclined position in which the levers extend generally in the direction from which the container is to be loaded onto the car, each of said levers being formed with a seat on the other end thereof to receive the respective rigid support members of said container, a chassis adapted to be separably connected to said container, said seats in the lower positions of said levers being substantially horizontally aligned with said support members of said container when said container rests on said chassis and means for backing said chassis onto the car and for drawing the chassis away from the car, whereby, said chassis with the container carried thereby may be backed onto the car to bring said rigid members, when extended into engagement with the respective lever seats, and on further backing, said levers are rocked toward their vertical positions to lift a substantial portion of the weight of said container from said chassis to permit withdrawal of the chassis, whereupon the said means for moving said levers may be actuated to lower said support members onto the respective supports.

5. The apparatus set forth in claim 4 wherein said elongate supports each carry a lug positioned adjacent the respective lever seats when in their lowered positions, said lugs being formed to at least partially overlie the respective container rigid support members when said members rest on said supports.

6. The apparatus set forth in claim 4 wherein said levers each include extension means on their upper ends for catching said rigid members of said container as the latter is moved onto the car with said rigid members extended.

7. The appartus set forth in claim 4 wherein said power means comprises a fluid actuated cylinder carried by each of said supports, said cylinders being connected between the respective supports and one of the levers carried thereby.

8. The apparatus set forth in claim 4 wherein said one ends of said levers are pivoted between spaced plates fixed to and depending from the respective supports, said plates at their lower ends riding on horizontally disposed wear plates.

9. The apparatus set forth in claim 4 including guide rail means mounted along each side rail structure on the inside of the car to serve as a chassis wheel guide.

10. Apparatus for transporting freight comprising a railroad car formed with upstanding side rail structures, an elongated container support slidably mounted on each side rail structure, cushioning means interposed between each container support and the side rail structure on which it is mounted, a container adapted to be mounted between and carried by said supports, said container carrying a pair of laterally extensible rigid support members on each side thereof engageable with said supports, means for locking said support members in extended position, said supports each including a pair of cam surfaces inclining upwardly in a direction away from the end of the car from which the container is to be loaded onto the car and removed therefrom, said cam surfaces of each support being spaced for engagement with the pair of support members of said container to be carried by it, power means engageable with said container for drawing said support members of said container, when the latter rest on said supports, longitudinally of said cam surfaces to raise and lower the container, said cam surfaces each terminating in an upstanding stop lug portion at their upper ends, a chassis adapted to be separably connected to said container, the lower portions of said cam surfaces being substantially horizontally aligned with said support members of said container when said container rests on said chassis, and means for backing said chassis onto the car and for drawing the chassis away from the car, whereby, said chassis with the container carried thereby may be backed onto the car to bring said rigid members, when extended, into engagement with said cam surfaces, respectively, and on further backing, said rigid members ride up said cam surfaces to lift a substantial portion of the weight of said container from said chassis to permit withdrawal of the chassis from under the container, whereupon the said power means may be actuated to lower said support members down said cam surfaces onto the respective supports.

11. The apparatus set forth in claim 10 wherein said power means comprises fluid operated cylinder means carried by each of said supports, said cylinder means of each support being mounted adjacent the cam surface of each support nearest said end of said car and being secured to the respective supports rearwardly of said nearest cam surface, with respect to the backing movement of said chassis in moving said container support members against said cam surface, said cylinder means of each support including means for engaging the container support member that engages said nearest cam surfaces, whereby said cylinder means may be operated to draw said support members longitudinally of said cam surfaces to raise and lower said container.

12. The apparatus set forth in claim 10 wherein said support members are each formed with a flanged outwardly projecting end and include roller bearing means for engagement with the respective cam surfaces.

13. The apparatus set forth in claim 11 wherein the means for engaging the respective container support members that each cylinder means carries comprises a head member formed with a seat for receiving the support member, said seat of each head member opening downwardly, said head member each including a downwardly facing cam surface forwardly of its seat against which the respective container support members engage to guide the seats of the respective head members onto the respective container support members, and shelf means associated with each of said cam surfaces for guiding the respective head members along a path of movement that is parallel to the respective cam surfaces.

14. The apparatus set forth in claim 10 wherein said supports each carry a plurality of pairs of said cam surfaces, with one of said cam surfaces of each pair being mounted for adjustment longitudinally of the respective supports, said pairs of cam surfaces being positioned for cooperation with additional containers provided with said support members, said power means comprising separate means carried by each support for drawing said support members of each container longitudinally of the respective cam surfaces.

15. Apparatus for handling freight comprising a container, said container carrying spaced laterally extensible support members on either side thereof, a railroad car formed with upstanding side rail structures on either side thereof, container supports carried by said car on said side rail structures, said container supports corresponding in number and location longitudinally of the car to the number and location of the respective container support members on the respective sides of the container, said support members when extended being proportioned to engage said supports, respectively, a chassis, means for separably connecting said chassis to said container, and means for moving said chassis onto the car from one end thereof and for drawing the chassis away therefrom, said supports each comprising mechanical advantage means acting between the car and said support members, when said support members of said container when carried by said chassis are brought into engagement with the respective supports under the motive action of said chassis moving means, for sufficiently raising the container with respect to said chassis through said support members, to permit said chassis to be withdrawn from under the container by said moving means, said mechanical advantage means each comprising a cam member secured to the respective rail structures and defining an upwardly facing cam surface inclining upwardly in a direction away from the end of the car from which the container is to be moved onto said car by said chassis moving means, with said supports, said container and said chassis being proportioned so that the lower portions of said cam surfaces are substantially horizontally aligned with said support members of said container when the said container rests on said chassis, and jack means carried by the car and operably associated with said supports for raising and lowering the container with respect to the car through said mechanical advantage means after the chassis has been removed from under the container, said jack means comprising a jack device secured to each side rail structure adjacent one of said cam members thereof and including an extensible and retractable member including a head portion formed with a seat for receiving the container support member that is to cooperate with said one cam member of the respective side rail structures, and power means for extending and retracting said retractable jack means.

16. In a railroad car for transporting freight containers of the type provided with spaced laterally extensible and retractable support members on either side thereof and adapted to be separably connected to a highway vehicle chassis, with the car including a bed provided with side wall structures proportioned to project above the bed to a height short of that corresponding to the height that the retractable support members ride above the ground when the container is carried by the chassis, the improvement wherein forward and rearward container support devices are carried by said car on said side wall structures, on either side of the car, said support devices corresponding in number and spaced relation longitudinally of the car to the number and spaced relation of the respective container support members on the container, said support devices being positioned with respect to the tops of said respective side wall structures to be engaged by the container support members, when the chassis carrying the container has been driven onto said bed and positioned with its support members disposed adjacent to and extended into alignment with said respective support devices and the chassis is moved to move the container and its support members in a direction toward the support devices, said support devices comprising mechanical advantage means operatively responsive to further movement of the chassis and container in said direction for sufficiently raising the container through the support members to permit the chassis to be withdrawn from under the container, and operatively responsive to movement of the container relative to the car in the opposite direction for lowering the container from such raised position, and jack means secured to either side of the car for moving the container longitudinally of the car in said opposite direction to lower same through the action of said mechanical advantage means as required to support the container support members on the respective side rail structures after the chassis has been removed from under the container, and for moving the container in the first mentioned direction to raise the container through the action of said mechanical advantage means for positioning a like chassis under the container.

17. Apparatus for handling freight comprising a container, said container carrying spaced laterally extensible and retractable support members on either side thereof, a chassis, means for separably connecting said chassis to said container, a railroad car including a bed provided with upstanding side wall structures proportioned to project above the bed to a height short of that corresponding to the height that the retractable support members ride above the ground when the container is carried by the chassis, means for moving said chassis onto the car from one end thereof and for drawing the chassis away therefrom, forward and rearward container support devices carried by said car on said side wall structures on either side of the car, said support devices corresponding in number and spaced relation longitudinally of the car to the number and spaced relation of the respective container support members on the container, said support devices being positioned with respect to the tops of said respective side wall structures to be engaged by the container support members, when said chassis carrying the container has been driven onto said bed and positioned with its support members disposed adjacent to and extended into alignment with said respective support devices longitudinally of the car and the chassis is moved to move the container and its support members in a direction toward the support devices, said support devices comprising mechanical advantage means operatively responsive to further movement of the chassis and container in said direction, under the motive action of said chassis moving means, for sufficiently raising the container through the support members to permit the chassis to be withdrawn from under the container, and operatively responsive to movement of the container relative to the car in the opposite direction, under the motive action of said chassis moving means, for lowering the container from such raised position, and jack means operatively secured to the car for moving the

container longitudinally of the car in said opposite direction to lower came through the action of said mechanical advantage means as required to support the container support members on the respective side wall structures after the chassis has been removed from under the container, and for moving the container in the first mentioned direction to raise the container through the action of said mechanical advantage means for positioning a like chassis under the container.

18. The apparatus set forth in claim 17 wherein said mechanical advantage means each comprise a lever secured adjacent one end thereof to the car for pivotal movement about an axis that extends generally transversely of said car and is positioned below the tops of the respective sidewall structures, stop means for limiting the pivotal movement of the respective levers between a substantially vertical position and an inclined position in which the respective levers extend generally in the direction from which the container is to be moved onto said car by said chassis moving means, each of said levers being formed with a seat on the other end thereof to receive the respective container support members on movement of the container in said first mentioned direction when said support members are in their extended positions, and wherein said jack means comprises a jack device secured between the car and one of said levers on either side of the car.

19. The apparatus set forth in claim 17 wherein said container support members adjacent the respective ends of the container comprises a tube secured to the container adjacent each end thereof and extending the width of the container, and a rod slidably mounted in each end of the tube, said rods being formed with outwardly projecting heads, and means for locking said rods in extended and retracted positions, said tubes each forming and replacing a crossbearer of said container.

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