Jan. 10, 1967 C. I. BOHLEN 3,297,178

SYSTEM OF TRANSFERRING CONTAINERIZED CARGO

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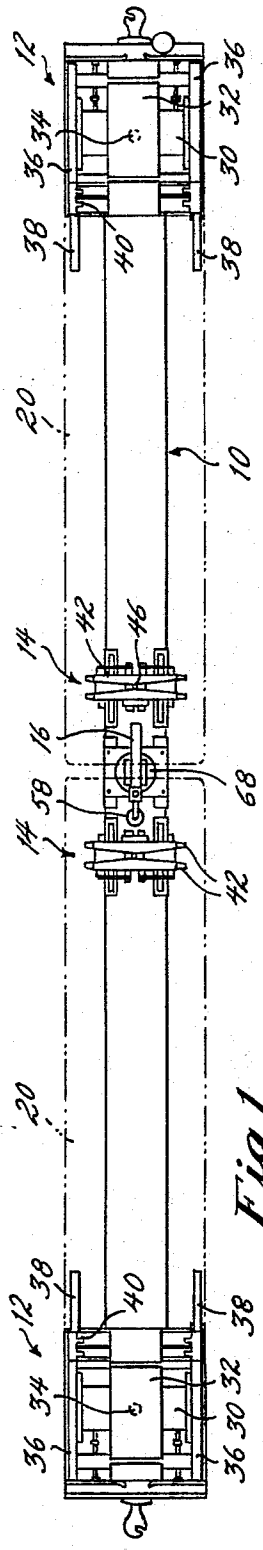


Fig. 1.

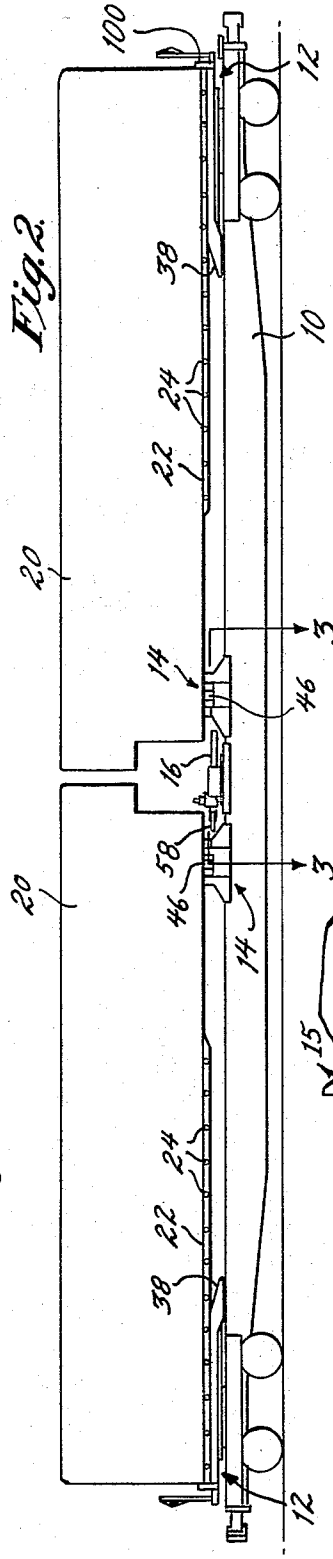


Fig. 2.

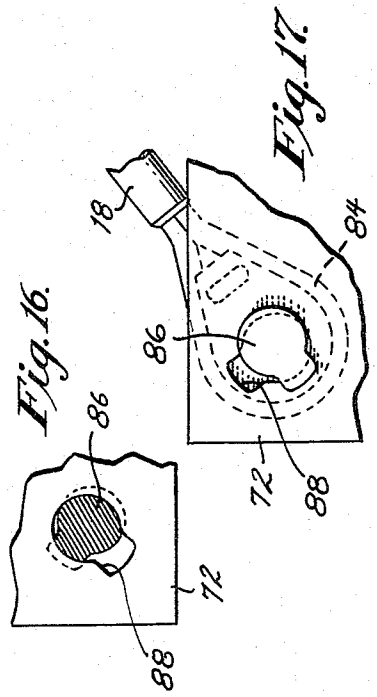


Fig. 16.

Fig. 17.

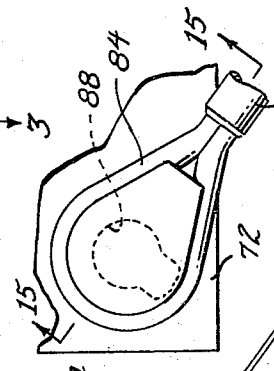


Fig. 14

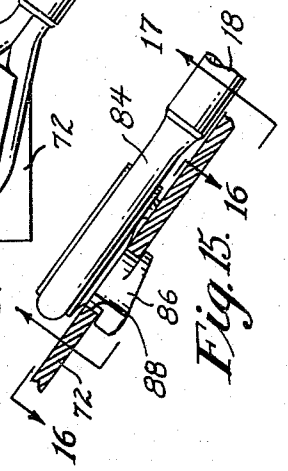


Fig. 15.

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SYSTEM OF TRANSFERRING CONTAINERIZED CARGO

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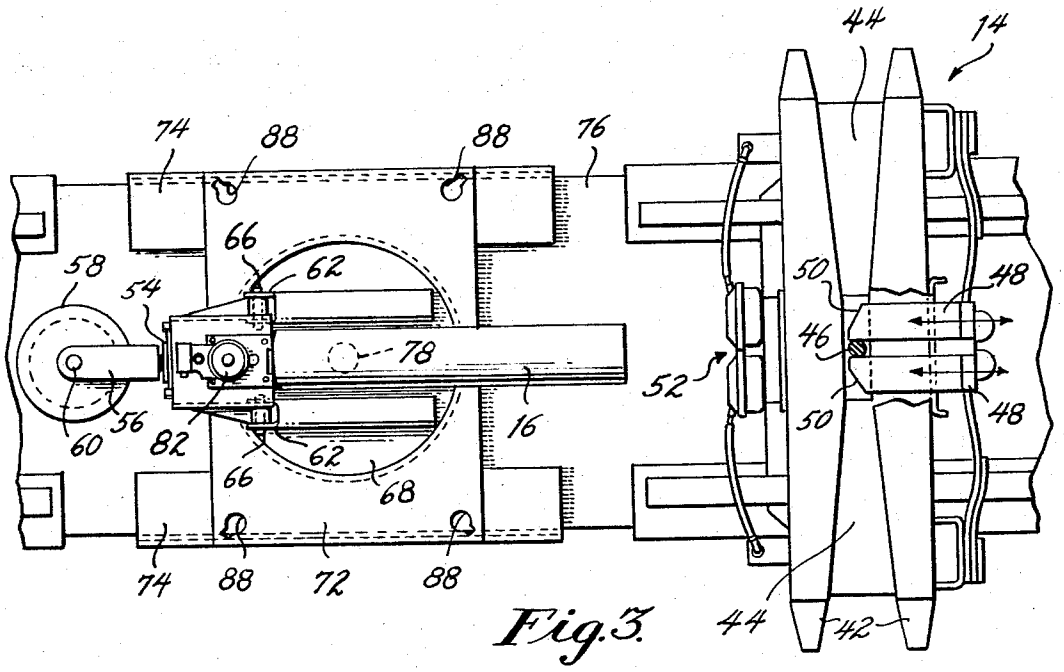


Fig. 3.

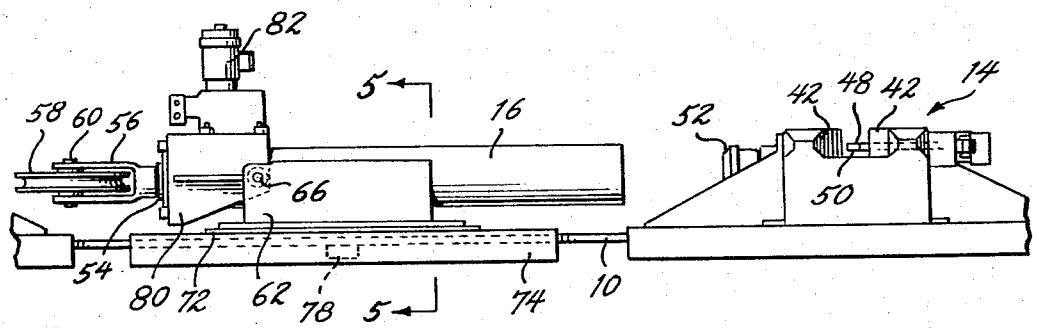


Fig. 4.

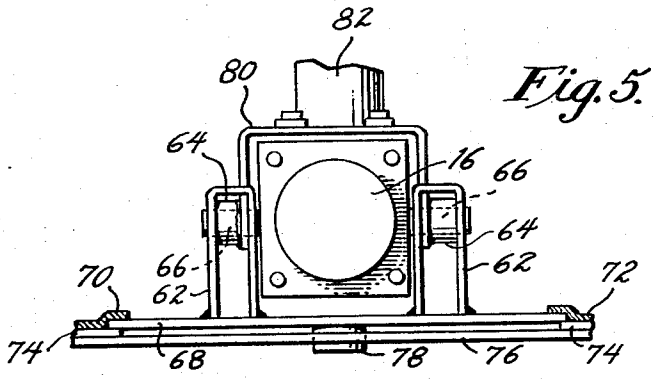


Fig. 5.

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SYSTEM OF TRANSFERRING CONTAINERIZED CARGO

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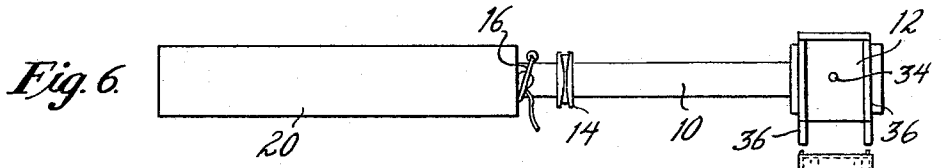


Fig. 6.

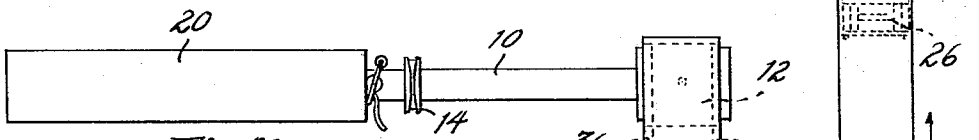


Fig. 7.

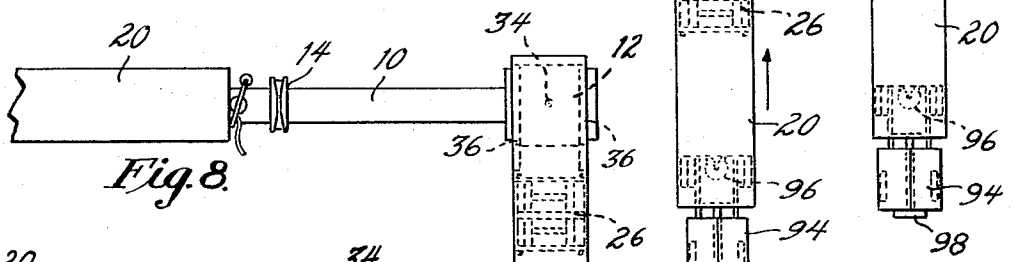


Fig. 8.

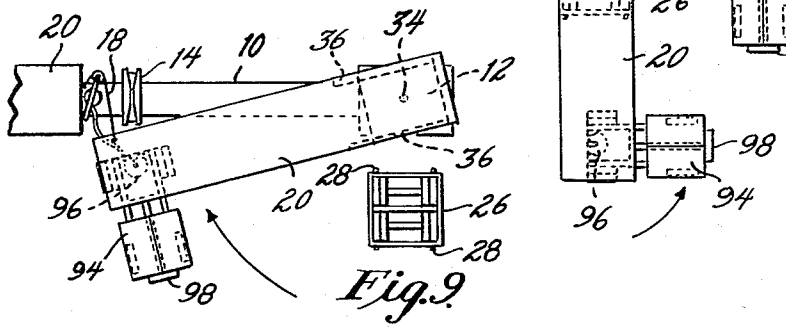


Fig. 9.

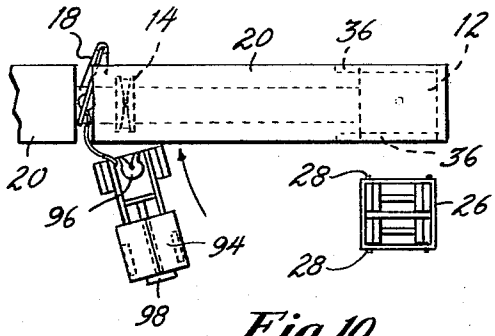


Fig. 10.

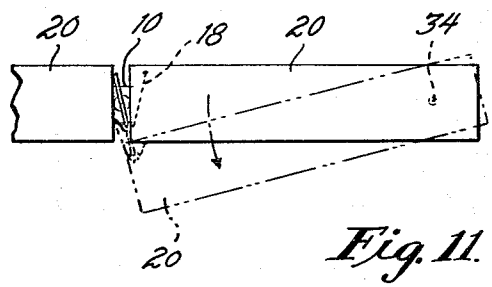


Fig. 11.

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SYSTEM OF TRANSFERRING CONTAINERIZED CARGO

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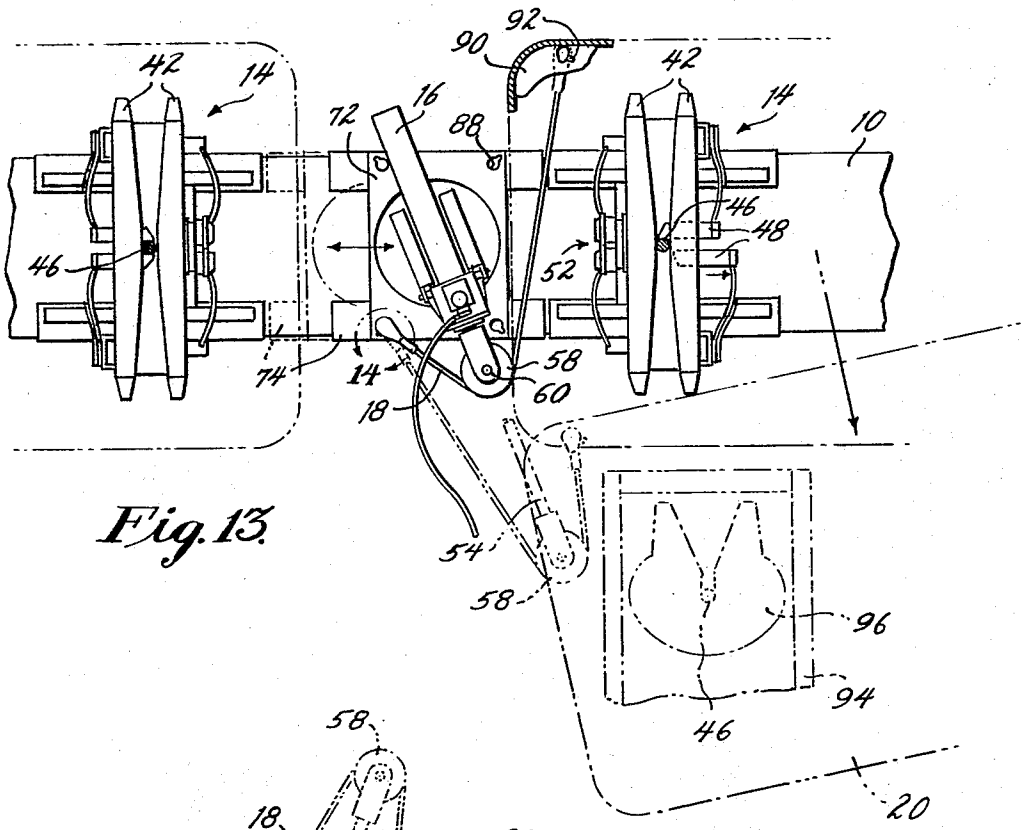


Fig. 13.

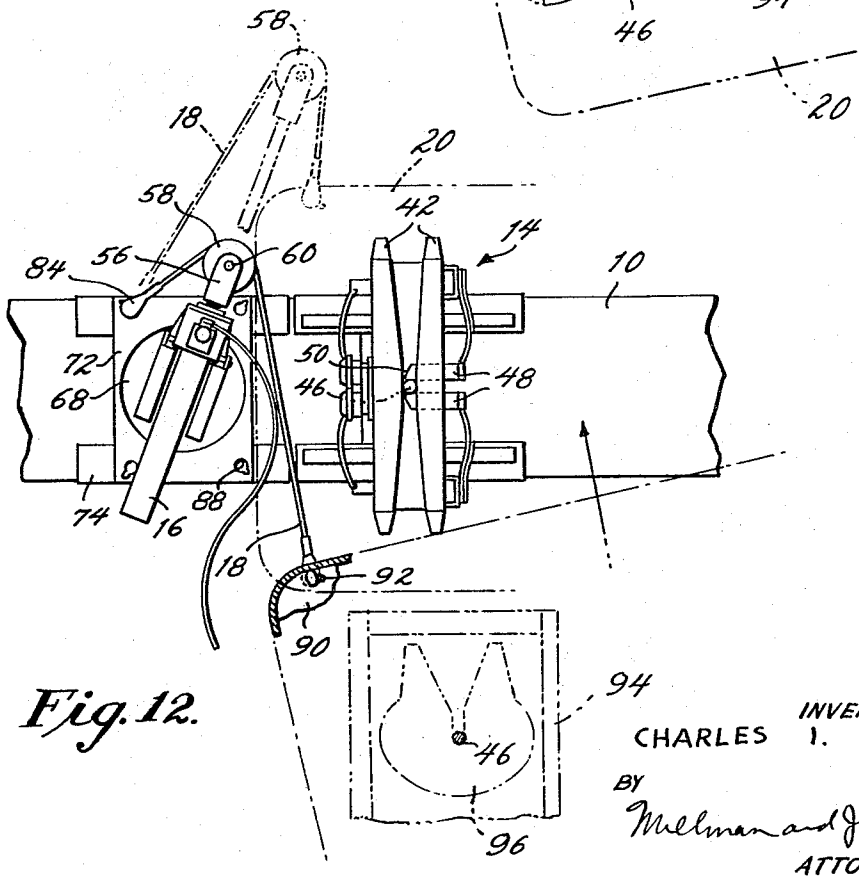


Fig. 12.

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United States Patent Office 3,297,178 Patented Jan. 10, 1967

3,297,178
SYSTEM OF TRANSFERRING CONTAINERIZED CARGO

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Filed May 17, 1965, Ser. No. 456,357
10 Claims. (Cl. 214—38)

This invention relates to a system of freight haulage in which the trailer body, laden with cargo, is transferred from a highway tractor and wheel assembly to a railroad car, other carrier or stationary support and constitutes a departure from the system disclosed in Patent No. 3,112,-040. In this patent transfer is effected by means of a ram operated from the tractor to push or pull the trailer body at one end while its other end is supported about a vertical pivot axis.

The primary object of the present invention is to provide a trailer body transfer system which eliminates the need for the ram and uses instead a mechanism mounted on the railroad car which is more economical in manufacture, installation and operation.

Another object of the invention is to provide a containerized cargo transfer system employing a railroad car upon which are mounted for rotation about vertical axes a turntable to receive the rear end of the trailer body and a hydraulic cylinder spaced from the turntable and having a piston rod and pulley at the end thereof to engage a cable connected between the other or front end of the trailer body and the railroad car whereby the trailer body can be readily and easily pushed onto or off the railroad car while the rear end is seated upon the turntable.

Another object of the invention is to provide a containerized cargo transfer system of the character described in which the railroad car is provided with a pair of spaced kingpin receivers at the center of the car, a pair of turntables at the remote ends thereof and a hydraulic cylinder mounted on the railroad car for movement in a horizontal plane between the kingpin receivers whereby two trailer bodies may be transferred to the railroad car from either side thereof.

Another object of the invention is to provide a containerized cargo transfer system of the character described in which the hydraulic cylinder is mounted on the railroad car for movement about a vertical and horizontal axis so that the rod with the end pulley operated thereby will accommodate to the cable when it is secured at one of its ends to the trailer body and at its other end to the railroad car.

Another object of the invention is to provide a containerized cargo transfer system of the character described in which the hydraulic cylinder is also mounted for longitudinal movement on the railroad car so that the cylinder can be turned to the proper position for transfer of trailer bodies on both ends of the car.

These and other objects of the invention will become more apparent as the following description proceeds in conjunction with the accompanying drawings, wherein:

FIG. 1 is a plan view of a railroad car incorporating the present invention;

FIG. 2 is a side elevational view of the railroad car with a pair of trailer bodies mounted thereon;

FIG. 3 is an enlarged sectional view taken on the line 3—3 of FIG. 2;

FIG. 4 is a side elevational view of the elements shown in FIG. 3;

FIG. 5 is a sectional view taken on the line 5—5 of FIG. 4;

FIGS. 6–11 are diagrammatic top plan views illustrating the system of transferring a trailer body to a railroad car employing the present invention;

FIG. 12 is a fragmentary enlarged plan view of the hydraulic cylinder and kingpin receivers illustrating the final step of transferring the trailer body onto the railroad car;

FIG. 13 is a view similar to FIG. 12 illustrating the initial step in removing the trailer body from the railroad car;

FIG. 14 is an enlarged elevational view of a cable end engaged in a socket on the railroad car and shown in area 14 on FIG. 13;

FIG. 15 is a sectional view taken on the line 15—15 of FIG. 14;

FIG. 16 is a sectional view taken on the line 16—16 of FIG. 15; and

FIG. 17 is a sectional view taken on the line 17—17 of FIG. 15.

Specific reference is now made to the drawings in which similar reference characters are used for corresponding elements throughout.

The railroad flatcar is indicated generally at 10 and is equipped at its remote ends with turntables 12 mounted for rotation around vertical axes and at its center with spaced kingpin receivers 14. Between the kingpins a hydraulic cylinder 16 is mounted for rotation about a vertical axis which operates a piston adapted to engage a cable 18 terminally secured to the trailer body 20 and the railroad car to push the trailer body on or off the car in a manner to be described in detail hereafter.

The trailer body 20 is conventional and includes longitudinal track angle members 22 along the bottom and at the sides thereof which extend to the rear of the body and include spaced apertures 24. A wheeled unit or bogie 26, see FIGS. 6–10, is provided which is also conventional and consists, among other things, of a subchassis or frame mounting a coupling mechanism including rods 28 which are retractable laterally through the sides thereof for removable coupling to the trailer body beneath the rear thereof via engagement in the track angle apertures 24. A suitable coupling mechanism is disclosed, for example, in Patents Nos. 2,831,700 and 2,841,-441.

Each turntable 12 is an assembly which is comprised of an inner boxlike member 30 having a central plate 32 which is provided with an aperture receiving a pin 34 upstanding from a pedestal mounted on the railroad car to provide the vertical rotating axis of the turntable. Secured to the opposite sides of inner member 30 are longitudinal apertured rails 36 with downwardly inclined ramps or noses 38. The turntable is equipped with means to permit it to tilt around a horizontal axis as well so that it can engage beneath the rear end of the trailer body. It also includes a trip mechanism 40 to actuate rods (not shown) that extend through the rails 36 for coupling to the trailer body via the track angle apertures 24.

Each kingpin receiver 14 is an assembly which is comprised of a pair of laterally extending members 42 which are mounted for sliding movement longitudinally of the car. The confronting surfaces of the members 42 converge inwardly towards their centers to form tapered guide throats 44 to permit access of the kingpin 46 carried at the forward end of the trailer body from either side of the car. Extending laterally and slidably through one of the members 42 at its center are a pair of latch bars 48 having inwardly inclined cam faces 50, the bars being spring urged towards the other member 42 into a locked position. Thus, when the kingpin 46 enters one of the throats 44 and engages one face of a member 42 it will cause the kingpin receiver assembly to slide and allow the kingpin to be centered on the throat. The kingpin then strikes the cam face 50 causing the latch bar 48 to retract until the kingpin engages the next bar 48 when the first latch bar 48 springs back to lock the kingpin in place, as seen in FIG. 3. To demount the trailer body from the

railroad car, one of the latch bars 48 must be again retracted and this can be effected manually or by air actuation as by appropriate air cylinders, hoses and valves, generally indicated at 52.

Coming now to the hydraulic cylinder 16, the same is a conventional double-acting cylinder whose piston rod 54 mounts a yoke 56 at its outer end which in turn rotatably mounts a pulley or sheave 58, the latter being rotatable in a horizontal plane about a vertical pin 60 carried by the yoke.

Secured to both side of the cylinder is a bracket 62 in the form preferably of an inverted U, there being bearings 64 between the legs of the bracket to journal pintles 66 that extend diametrically and laterally from the cylinder to form a horizontal axis about which the cylinder can tilt.

The brackets 62 are secured to a circular plate 68 the marginal edge of which is in turn rotatably received between the raised circular flange 70 of a further plate 72, the latter being secured to longitudinal angle members or channels 74 which slidably engage the edges of the railroad car bed plate 76. A pin 78 depends from the upper plate 72 and extends through an aperture in the bed plate. Thus, the cylinder 16 is also movable in a longitudinal direction relative to the railroad car and is rotatable around a vertical axis extending through the pin 78.

Mounted at the forward end of the brackets 62 is a support 80 for a pump 82 to actuate the cylinder. The pump can be energized from the tractor battery by extending an electric cord from the pump to a take off from the tractor battery.

The cable 18 is somewhat flexible and has loops 84 at each end which mount coupling pins 86 of bayonet contour, see FIGS. 14–17. Adjacent the corners of the cylinder mounting plate 72 are apertures 88 also of bayonet contour, there being a clearance between the plate 72 and members 74 so that the apertures 88 serve, in effect, as sockets capable of removably receiving the coupling pins 86. Similarly, the bottom wall 90 of the trailer body 20, adjacent both its front corners, is also provided with slots 92 of bayonet contour to removably receive the coupling pin 86.

In use, as seen in FIGS. 6–11, a tractor 94 having the conventional fifth wheel 96 equipped with means to raise and lower the same is coupled via the fifth wheel to the trailer kingpin 46. The tractor 94 is also equipped with means to effect a zero turning radius, such for example, as a front wheel 98 which rotates about an axis longitudinally through the tractor, which front wheel can be lowered to engage te ground thus raising the remaining wheels. An example of such a tractor is shown and described in the aforementioned Patent No. 3,112,040.

The brakes are then applied to the bogie 26 and the pins 28 retracted to the uncoupled position. The turntable 12 is rotated to a position transverse that of the railroad car opposite the rear end of the trailer, as shown in FIG. 6. Then the trailer is backed up in which operation the body 20 slides over the bogie and the rear end hereof engages the nose 38 of the turntable causing it to tilt. Continued backing up movement will then cause the rear end of the trailer body to actuate the coupling mechanism 40 on the turntable and when the rear of the trailer body reaches the backstop 100 of the turntable, the mechanism 40 releases coupling pins which engage in a pair of opposed track angle apertures 24 to effect connection between the trailer body and the turntable, as seen in FIG. 7.

Then the front wheel 98 is lowered and the tractor 94 turned to the position shown in FIG. 8 where the longitudinal axis of the tractor is substantially perpendicular to that of the body and the tractor is again backed up. This causes the trailer body to rotate around the vertical pin or axis 34 of the turntable until the body assumes the position shown in FIG. 9, with the tractor still coupled thereto, a position in which the longitudinal axis of the body is at an acute angle of perhaps 15° to that of the railroad car.

To complete the transfer, as seen in FIGS. 10 and 12, one end of the cable 18 is coupled to the railroad car by having its pin engage in the slot 88 on the side of the railroad car opposite the trailer body and by having its other end coupled to the trailer body via the slot 92 in the body adjacent the corner nearest the railroad car. It will be understood that by turning the cable and the pins 86 they will be made first to align with the slots 88 and 92 in the ready-to-couple position and will then traverse the slots in the coupled position.

The hydraulic cylinder 16 is then moved longitudinally to the appropriate position and turned around so that its piston rod will point towards the side of the railroad car opposite the trailer body. The pump 82 is then energized and is preferably driven from the tractor battery (12 v.). The hydraulic cylinder may also be driven directly from the tractor hydraulic system in which case the electric motor on the car may be omitted. This causes the piston rod to be extended until the pulley 58 engages the cable 18 intermediate its ends. The engagement is accommodated by tilting of the hydraulic cylinder around the horizontal axis of its pintles 66. Further extension of the piston rod will apply a force on the cable to pull the front end of the trailer body onto the railroad car as the pulley rides along the cable, it being understood that at this stage the tractor remains beneath the front end of the body to support the same but has been uncoupled therefrom. In this movement, the kingpin 46 of the trailer body enters one of the throats 44 of the receiver 14 until it engages and clears a latch bar 48 to become locked on the railroad car with the longitudinal axis of the trailer body substantially parallel with that of the railroad car. By moving the hydraulic cylinder to another position longitudinally of the car and disposing at a different angle another trailer body can be transferred to the other end of the car, as suggested in FIG. 1. In transit on the railroad car, the piston rod of the cylinder is retracted, the cable removed and the cylinder placed in a longitudinal position.

It will be understood by skilled artisans that removal of each trailer body is effected by a reverse operation, as shown in FIGS. 11 and 13. In this operation, the cable is coupled at one end to the railroad car in a slot 88 which is adjacent the side of the car from which the body will be removed, while the other end of the cable is coupled to one or the other front corner of the body. The hydraulic cylinder will be oriented so that its piston rod extends toward the side of car from which the body will be removed. It will also be understood that one of the latch bars 48 will be cocked to an open position so that when the piston rod is extended with its pulley exerting a force on the cable to pull the front end of the body off the car, the kingpin will be free to move out of the receiver and re-engage the fifth wheel 96 of the waiting tractor 94.

While a preferred embodiment has here been shown and described, it will be understood that skilled artisans may make variations without departing from the spirit of the invention and scope of the appended claims.

I claim:

1. In a freight handling system, a freight carrying body having front and rear end portions, a highway wheel assembly, means for removably coupling said wheel assembly to said rear end portion of said body, means coactive between said railroad car and said rear end portion of said body to support the same on said railroad car for rotation about a vertical axis when said wheel assembly has been uncoupled from said body, and means to push said front end portion of said body selectively onto and off said railroad car while said rear end portion of said body is supported for rotation on said railroad car, said last-named means including a cable, means re-

movably securing the ends of said cable to said railroad car and said body at its front end portion, a hydraulic cylinder, means mounting said cylinder on said railroad car for movement around a vertical axis, a piston rod operable in said cylinder, means on the outer end of said piston rod to engage said cable intermediate its ends whereby extension of said piston rod will move said front end portion of said body relative to said railroad car, and releasable means to secure said front end portion of said body on said railroad car.

2. In a freight handling system, a freight carrying body having front and rear end portions, a highway wheel assembly, means for removably coupling said wheel assembly to said rear end portion of said body, means coactive between said railroad car and said rear end portion of said body to support the same on said railroad car for rotation about a vertical axis when said wheel assembly has been uncoupled from said body, and means to push said front end portion of said body selectively onto and off said railroad car while said rear end portion of said body is supported for rotation on said railroad car, said last-named means including a cable, means removably securing the ends of said cable to said railroad car and said body at its front end portion, a hydraulic cylinder, means mounting said cylinder on said railroad car for movement around a vertical axis, a piston rod operable in said cylinder, a pulley mounted for rotation about a vertical axis upon the outer end of said piston rod and adapted to engage said cable intermediate its ends whereby extension of said piston rod will cause a pushing force to be applied to said cable and thereby move said front end portion of said body relative to said railroad car, and releasable means to secure said front end portion of said body on said railroad car.

3. In a freight handling system, a freight carrying body having front and rear end portions, a highway wheel assembly, means for removably coupling said wheel assembly to said rear end portion of said body, means coactive between said railroad car and said rear end portion of said body to support the same on said railroad car for rotation about a vertical axis when said wheel assembly has been uncoupled from said body, and means to push said front end portion of said body selectively onto and off said railroad car while said rear end portion of said body is supported for rotation on said railroad car, said last-named means including a cable, means removably securing the ends of said cable to said railroad car and said body at its front end portion, a hydraulic cylinder, means mounting said cylinder on said railroad car for movement around a vertical axis, means mounting said hydraulic cylinder on said railroad car for movement about a horizontal axis, a piston rod operable in said cylinder, means on the outer end of said piston rod to engage said cable intermediate its ends whereby extension of said piston rod will move said front end portion of said body relative to said railroad car, and releasable means to secure said front end portion of said body on said railroad car.

4. In a freight handling system, a freight carrying body having front and rear end portions, a highway wheel assembly, means for removably coupling said wheel assembly to said rear end portion of said body, means coactive between said railroad car and said rear end portion of said body to support the same on said railroad car for rotation about a vertical axis when said wheel assembly has been uncoupled from said body, and means to push said front end portion of said body selectively onto and off said railroad car while said rear end portion of said body is supported for rotation on said railroad car, said last-named means including a cable, means removably securing the ends of said cable to said railroad car and said body at its front end portion, a hydraulic cylinder, means mounting said cylinder on said railroad car for movement around a vertical axis, means mounting said hydraulic cylinder on said railroad car for movement about a horizontal axis, means mounting said hydraulic cylinder on said railroad car for movement longitudinally thereof, a piston rod operable in said cylinder, means on the outer end of said piston rod to engage said cable intermediate its ends whereby extension of said piston rod will move said front end portion of said body relative to said railroad car, and releasable means to secure said front end portion of said body on said railroad car.

5. In a freight handling system, a freight carrying body having front and rear end portions and a kingpin depending from said front end portion, a highway wheel assembly, means for removably coupling said wheel assembly to said rear end portion of said body, a turntable mounted for rotation about a vertical axis on said railroad car, a latch-operated kingpin receiver mounted on said railroad car in spaced relation to said turntable and means to push said front end portion of said body selectively onto and off said railroad car while said rear end portion of said body is supported on said turntable and said wheel assembly has been uncoupled therefrom, said last-named means including a cable, means removably securing said cable terminally to said railroad car adjacent said kingpin receiver and to said front end portion of said body, a hydraulic cylinder mounted for rotation about a vertical axis on said railroad car adjacent said kingpin receiver, a piston rod operable in said cylinder having a horizontal pulley at its outer end to engage said cable and apply a pushing force thereon when extended so that said front end portion of said body will move relative to railroad car and said kingpin will move into and out of said kingpin receiver.

6. The combination of claim 5 and a tractor releasably coupled to said kingpin and including a means to effect zero turning radius whereby after said rear end portion has been supported on said turntable, said front end portion can be moved closely adjacent said railroad car by backing up said tractor towards said railroad car before finally pushing said front end portion of said body onto said railroad car via said hydraulic cylinder, piston rod and cable.

7. In a freight handling system, a railroad car comprising a turntable mounted thereon for rotation about a vertical axis and adapted to support one end portion of a freight carrying body, a cable adapted for removable connection terminally to said railroad car and the other end portion of the body, a hydraulic cylinder mounted for rotation around a vertical axis on said railroad car, and a piston operable in said cylinder having means at its outer end adapted to engage said cable and push the other end portion of the body relative to the railroad car when the one end portion of the body is supported on said turntable.

8. In a freight handling system, a railroad car comprising a turntable mounted thereon for rotation about a vertical axis and adapted to support one end portion of a freight carrying body, a cable adapted for removable connection terminally to said railroad car and the other end portion of the body, a hydraulic cylinder, means mounting said cylinder on said railroad car for movement around a vertical axis, means mounting said cylinder on said railroad car around a horizontal axis, and a piston operable in said cylinder having means at its outer end adapted to engage said cable and push the other end portion of the body relative to the railroad car when the one end portion of the body is supported on said turntable.

9. In a freight handling system, a railroad car comprising a turntable mounted thereon for rotation about a vertical axis and adapted to support one end portion of a freight carrying body, a cable adapted for removable connection terminally to said railroad car and the other end portion of the body, a hydraulic cylinder, means mounting said cylinder on said railroad car for movement around a vertical axis, means mounting said cylinder on said railroad car around a horizontal axis, means

mounting said cylinder on said railroad car for movement longitudinally thereof, and a piston operable in said cylinder having means at its outer end adapted to engage said cable and push the other end portion of the body relative to the railroad car when the one end portion of the body is suported on said turntable.

10. In a freight handling system, a railroad car comprising a turntable mounted thereon for rotation about a vertical axis and adapted to support one end portion of a freight carrying body, a cable adapted for removable connection terminally to said railroad car and the other end portion of the body, a hydraulic cylinder mounted for rotation around a vertical axis on said railroad car, a piston operable in said cylinder having means at its outer end adapted to engage said cable and push the other end portion of the body relative to the railroad car when the one end portion of the body is supported on said turntable, and a means on said railroad car adjacent said hydraulic cylinder adapted to releasably retain the other end portion of the body in a predetermined position on said railroad car.

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