Oct. 10, 1961 D. CLEJAN 3,003,434

RAILWAY CARS FOR TRANSPORTING ROAD SEMI-TRAILERS

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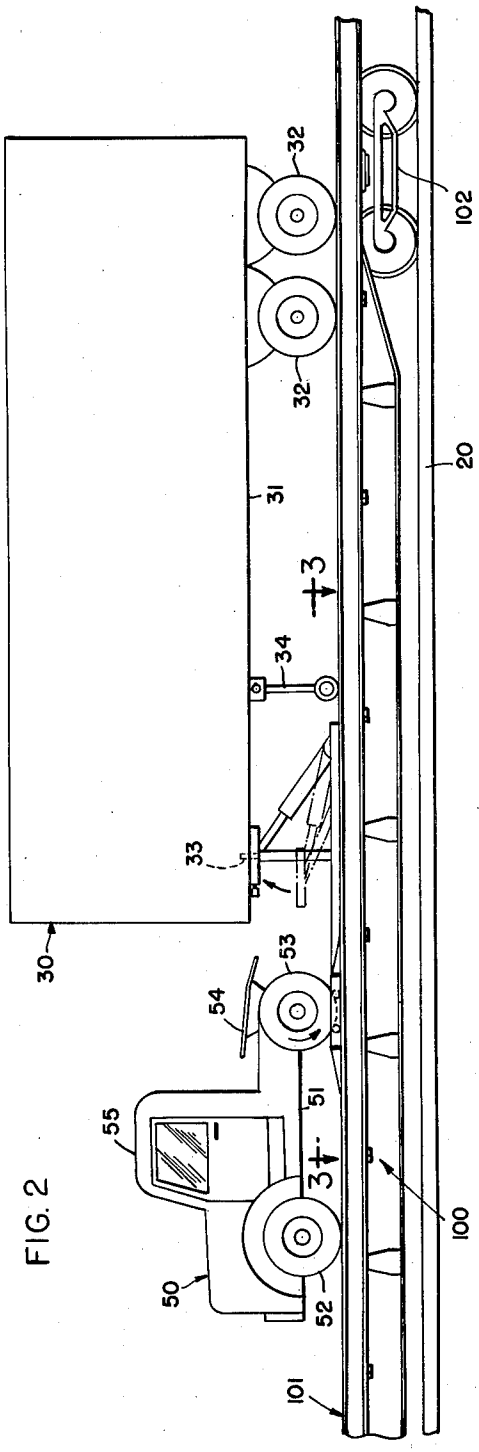


FIG. 2

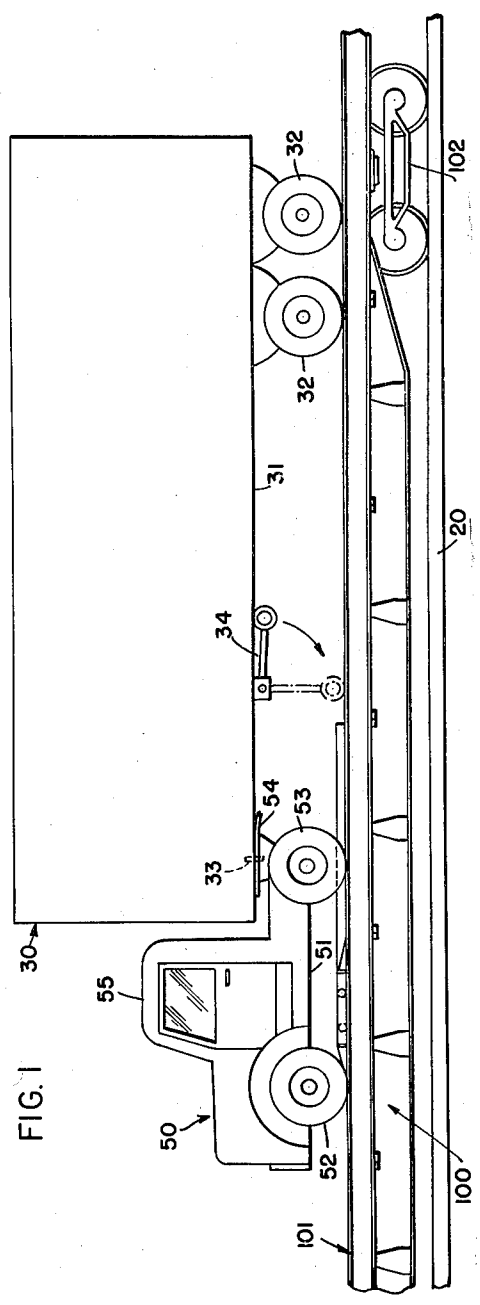


FIG. 1

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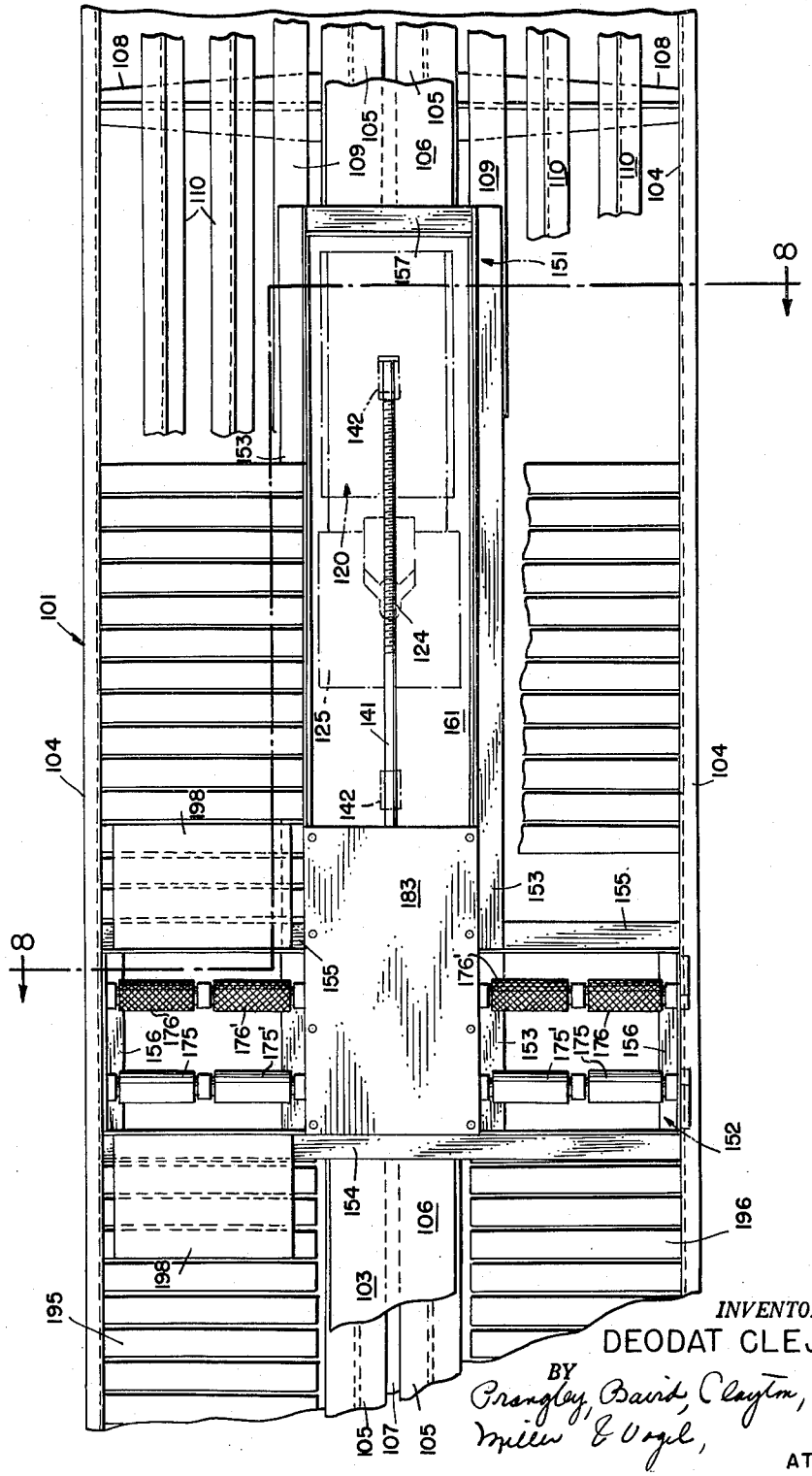
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RAILWAY CARS FOR TRANSPORTING ROAD SEMI-TRAILERS

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FIG. 3



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RAILWAY CARS FOR TRANSPORTING ROAD SEMI-TRAILERS

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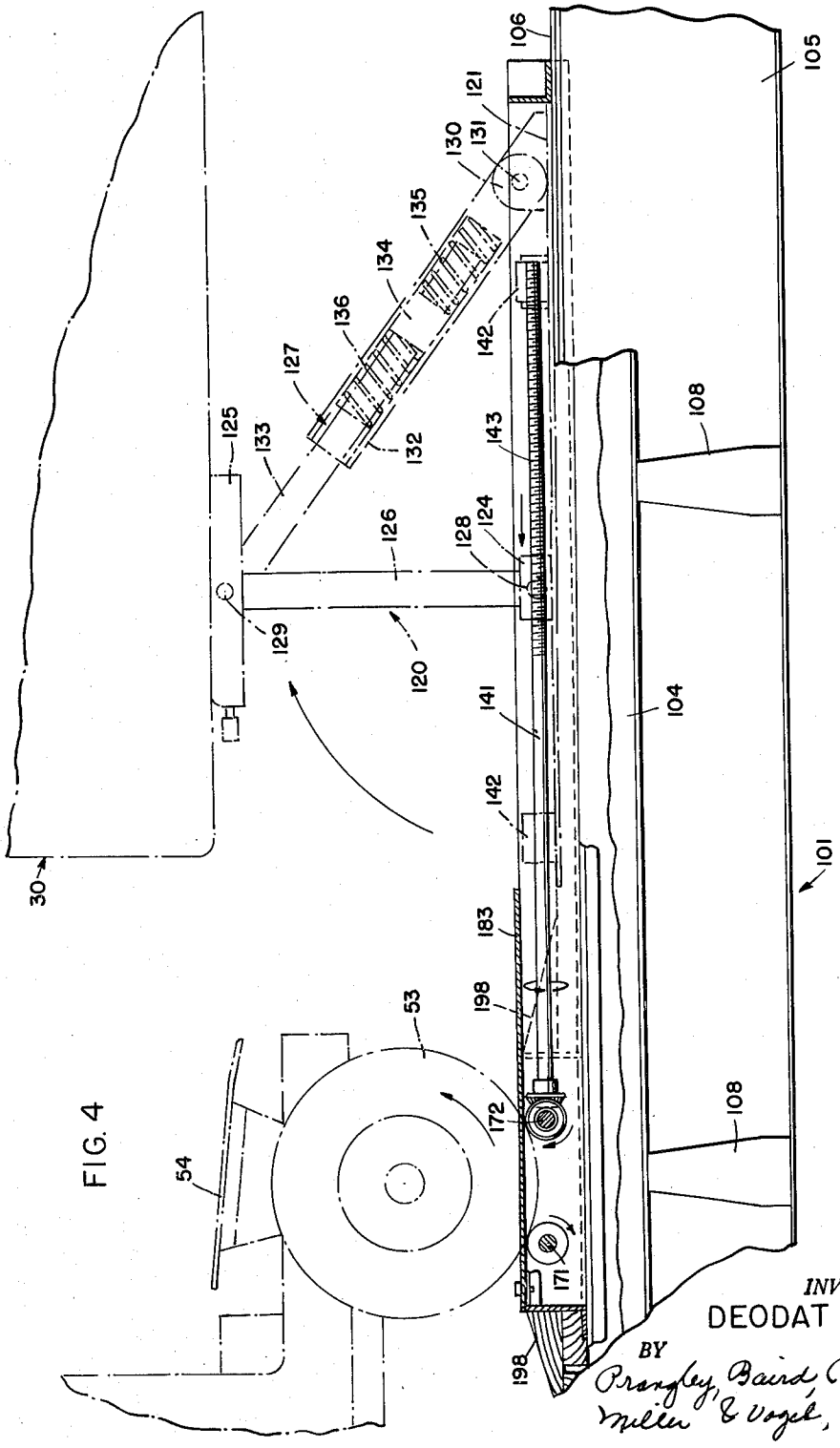


FIG. 4

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RAILWAY CARS FOR TRANSPORTING ROAD SEMI-TRAILERS

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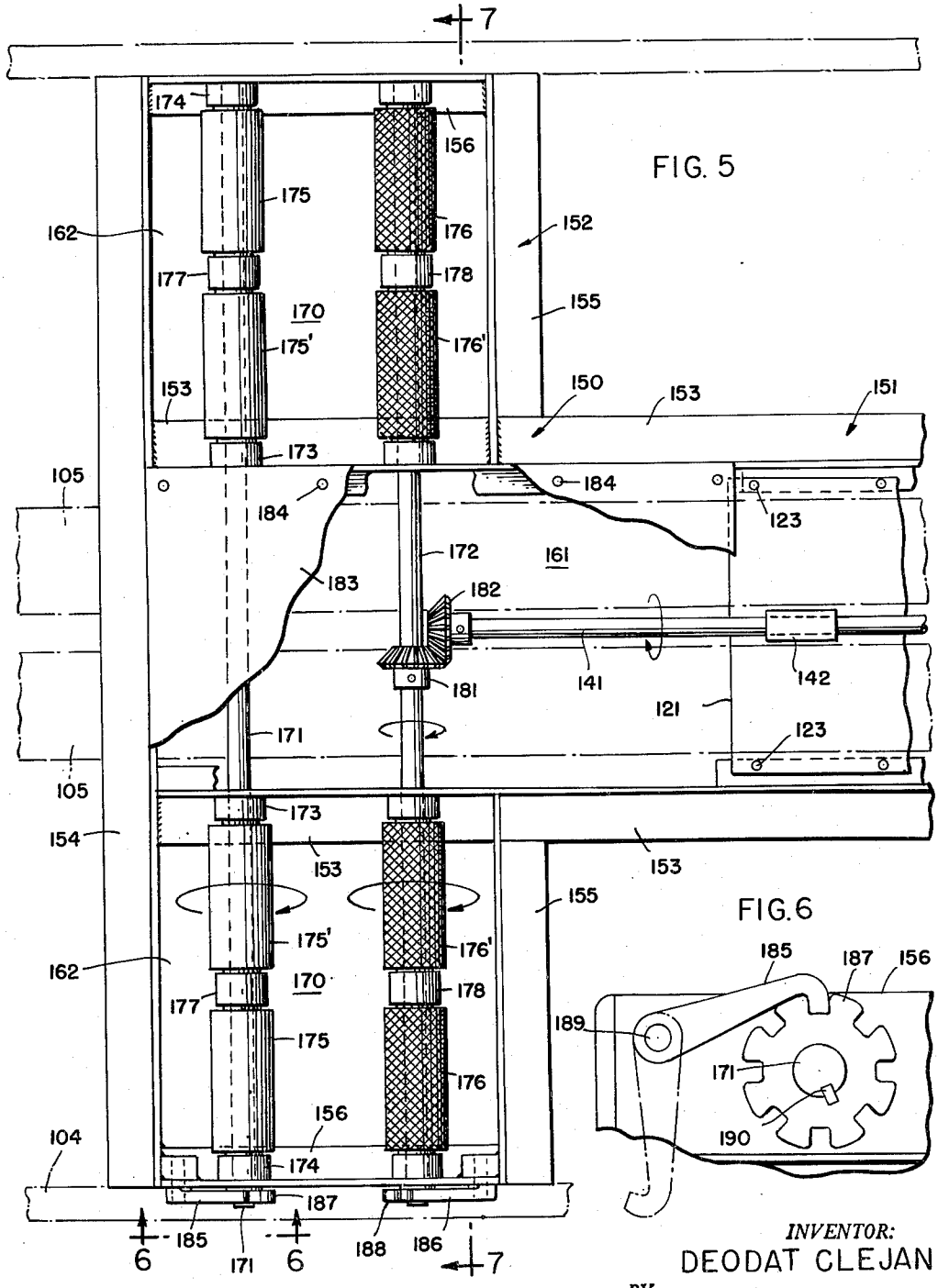


FIG. 5

FIG. 6

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RAILWAY CARS FOR TRANSPORTING ROAD SEMI-TRAILERS

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FIG. 7

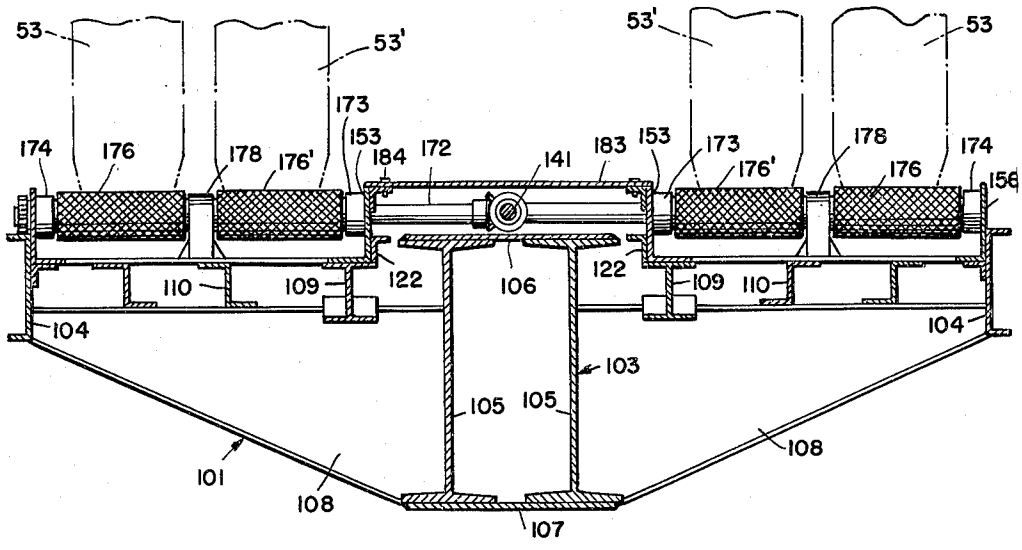
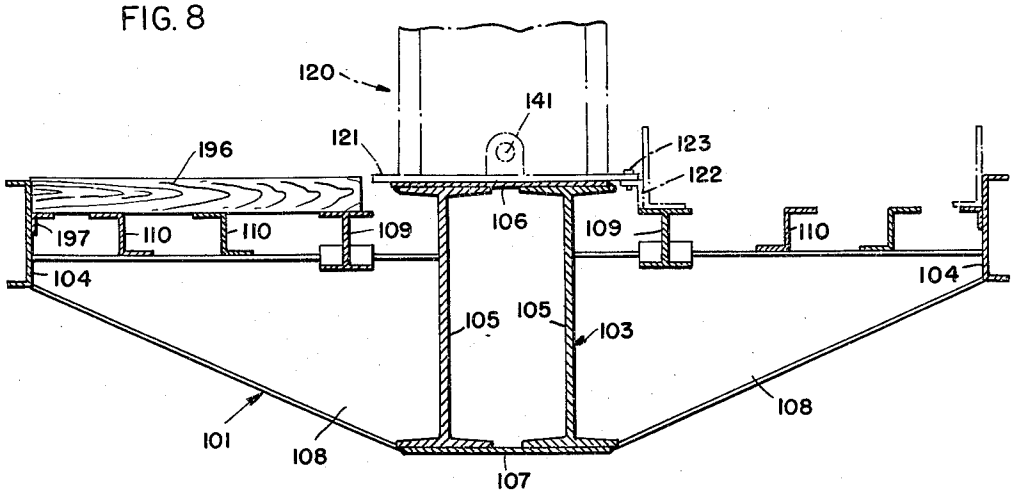


FIG. 8



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United States Patent Office 3,003,434 Patented Oct. 10, 1961

3,003,434

RAILWAY CARS FOR TRANSPORTING ROAD SEMI-TRAILERS

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Filed July 29, 1960, Ser. No. 46,175
9 Claims. (Cl. 105—368)

The present invention relates to freight transportation systems, and more particularly to railway cars for transporting road semi-trailers.

In a freight transportation system of the character mentioned, a railway car is provided that includes a frame upon which a road semi-trailer is mounted for transportation upon the railway car. Also the railway car comprises a hitch including a base plate mounted upon the frame and a fifth-wheel mechanism and expansible-contractible structure interconnecting the base plate and the fifth-wheel mechanism, the structure mounting the fifth-wheel mechanism for selective movements between storage and erected positions with respect to the frame. More particularly, the structure is expansible to move the fifth-wheel mechanism from its storage position into its erected position, and is contractible to move the fifth-wheel mechanism from its erected position into its storage position. The fifth-wheel mechanism in its storage position is disposed closely adjacent to the top of the frame and in non-interfering relation with movements of a road semi-trailer and of a road tractor, both carried on the top of the frame; and the fifth-wheel mechanism in its erected position is disposed well above the top of the frame and adapted to support the front end of a road semi-trailer carried on the top of the frame. Moreover, the fifth-wheel mechanism is selectively operative to latch and to release the king pin carried by the front end of a road semi-trailer supported thereby in its erected position. Furthermore, the hitch comprises an actuating shaft rotatably mounted upon the base plate, the shaft being rotatable in one direction to expand the structure, so as to move the fifth-wheel mechanism from its storage position into its erected position, and the shaft being rotatable in the opposite direction to contract the structure, so as to move the fifth-wheel mechanism from its erected position into its storage position.

In the freight transportation system, at the terminals at which the semi-trailers are loaded and unloaded with respect to the railway cars, there are provided suitable pneumatic torque wrenches, together with the usual pneumatic appurtenances; whereby the shafts for selectively actuating the various hitches may be readily rotated in the required directions in the selective actuations of the hitches between the storage and erected positions thereof, as required in the loading and unloading operations mentioned.

While this arrangement is entirely satisfactory at relatively large well-equipped freight terminals, the difficulty is encountered at relatively small freight terminals that there are no pneumatic wrenches, or other power accessories, that may be used for the purpose of selectively rotating the actuating shafts of the hitches, as required in the loading and unloading operations. Accordingly at the relatively small freight terminals, the shafts mentioned must be manually operated; which, of course, is exceedingly difficult work and very time-consuming, thereby rendering the loading and unloading of semi-trailers upon the railway cars at the relatively small freight terminals substantially more expensive and time-consuming than are desirable.

Accordingly, it is the general object of the present invention to provide in a railway car that is adapted for transporting a road semi-trailer, both a hitch that is selectively movable between storage and erected positions with respect to the frame of the railway car and road tractor operated mechanism for selectively actuating the hitch between its storage and erected positions.

Another object of the invention is to provide a railway car of the character noted, wherein the road tractor operated mechanism mentioned is essentially in the form of a tread-mill that is adapted removably to support the drive wheels of the road tractor in a supported position upon thef rame of the railway car, whereby selective rotations of the drive wheels of the road tractor in opposite directions effect selective operations of the tread-mill and the consequent selective movements of the hitch carried by the railway car between its storage and erected positions.

A further object of the invention is to provide in a railway car, a semi-trailer hitch that is selectively operative between storage and erected positions, and also self-contained road tractor operated mechanism for selectively actuating the hitch between its storage and erected positions, wherein the actuating mechanism may be selectively operated in a ready manner by the tractor driver incident to leading or unloading of the road semi-trailer with respect to the railway car, and without the performance by the driver of operations that are foreign to the usual mode required in the driving of the tractor.

A still further object of the invention is to provide a railway car of the character described that is of improved and simplified construction and arrangement.

Further features of the invention pertain to the particular arrangement of the elements of the freight transportation system and of the elements of the railway car; whereby the above-outlined and additional operating features thereof are attained.

The invention, both as to its organization and method of operation, together with further objects and advantages thereof, will best be understood by reference to the following specification, taken in connection with the accompanying drawings, in which:

FIGURE 1 is a fragmentary side elevational view of a freight transportation system embodying the present invention, and more particularly of a railway car comprising a frame carrying a foldable semi-trailer hitch having storage and erected positions and also carrying a tread-mill for selectively operating the hitch between its two positions, the hitch being illustrated in its storage position, and also illustrating the support upon the top of the frame of both a road semi-trailer and a road tractor;

FIG. 2 is another fragmentary side elevational view of the railway car, similar to FIG. 1, and illustrating the hitch in its erected position supporting the front end of the cooperating road semi-trailer, and also illustrating the drive wheels of the road tractor in driving relation with the cooperating tread-mill;

FIG. 3 is an enlarged fragmentary plan view of the immediate portion of the railway car, illustrating the cooperation between the hitch and the tread-mill and the associated deck also carried by the frame of the railway car;

FIG. 4 is a further enlarged fragmentary longitudinal sectional view of the intermediate portion of the railway car of FIG. 3;

FIG. 5 is a still further enlarged fragmentary plan view of the intermediate portion of the railway car of FIGS. 3 and 4;

FIG. 6 is a greatly enlarged side elevational view of one of the lock mechanisms incorporated in the tread-mill, this view being taken in the direction of the arrows along the line 6—6 in FIG. 5;

FIG. 7 is a still further enlarged lateral sectional view

of the railway car, taken in the direction of the arrows along the line 7—7 in FIG. 5; and

FIG. 8 is a still further enlarged lateral sectional view of the railway car, taken in the direction of the arrows along the offset line 8—8 in FIG. 3.

Referring now to FIGS. 1 and 2 of the drawings, the freight transportation system there illustrated and embodying the features of the present invention essentially comprises a railway car **100** provided with an elongated frame **101** supported at the opposite ends thereof by a pair of trucks **102** of standard rail gauge that cooperate with an associated railway track **20** also of standard rail gauge. The railway car **100** is especially designed to transport road semi-trailers and is normally arranged to transport two such road semi-trailers adjacent to the opposite ends thereof, one such road semi-trailer being indicated at **30** on the right-hand end of the railway car **100**, as illustrated. As explained more fully hereinafter, the road semi-trailers **30** are selectively loaded and unloaded with respect to the railway car **100**, utilizing a road tractor **50**, the road tractor **50** being illustrated in a supported position adjacent to the intermediate portion of the railway car **100**.

The road semi-trailer **30** comprises a chassis or frame **31** carrying adjacent to the rear thereof road wheels **32**, and carrying adjacent to the front end thereof a depending king pin **33**. Also, the chassis **31** of the road semi-trailer **30** carries a front landing gear **34** disposed rearwardly of the king pin **33**, and mounted for selective movements between a raised position, as shown in FIG. 1, and a lowered position, as shown in FIG. 2.

The road tractor **50** comprises a chassis **51** carrying front steering wheels **52** adjacent to the front end thereof and rear drive wheels **53** and **53'** adjacent to the rear end thereof, dual rear wheels being illustrated, each of the outer rear wheels being designated **53** and each of the inner rear wheels being designated **53'**. Also, the chassis **51** of the road tractor **50** carries adjacent to the rear end thereof a fifth-wheel mechanism **54** that is adapted selectively to couple and to uncouple the king pin **33** of the road semi-trailer **30**, in the usual manner. Moreover, the road tractor **50** comprises the usual motor facility, as well as a driver's cab **55** containing the usual controller for selectively controlling the driving of the drive wheels **53** and **53'** in forward and reverse directions and for selectively governing the operation of the fifth-wheel mechanism **54** in a conventional manner.

Referring now to FIGS. 3, 7 and 8, the frame **101** of the railway car **100** comprises a longitudinally extending center sill **103**, a pair of longitudinally extending and laterally spaced-apart side sills **104**, and a pair of laterally extending and longitudinally spaced-apart end sills, not shown. The center sill **103** is of composite construction, including a pair of longitudinally extending and laterally spaced-apart I-beams **105** that are secured together by upper and lower tie plates **106** and **107**, respectively; whereby the center sill **103** is of box-like form. Further, the frame **101** comprises a plurality of laterally extending and longitudinally spaced-apart body beams **108**, connecting together the center sill **103** and the side sills **104**. Also, the frame **101** comprises a pair of longitudinally extending and laterally spaced-apart deck sills **109** respectively disposed on opposite sides of the I-beams **105** of the center sill **103** and supported on top of the body beams **108**, the deck sills **109** being in the form of H-sections. Further, the frame **101** comprises a plurality of longitudinally extending and laterally spaced-apart deck sills **110** respectively disposed between the deck sills **109** and the side sills **104** and supported on top of the body beams **108**, the deck sills **110** being in the form of Z-sections. Of course, the elements **104**, **105**, **106**, **107**, **108**, **109** and **110** are formed of steel and are suitably secured together, as by welding, in order to provide the composite rigid frame **101** of the railway car **100**.

Further, the frame **101** of the railway car **100** carries a pair of longitudinally spaced-apart semi-trailer hitches **120**, each of which is adapted to support the front end of one of the corresponding adjacent one of the road semi-trailers **30**; and as best shown in FIGS. 3, 4, 7 and 8, the hitch **120** illustrated essentially comprises a longitudinally extending base plate **121** that is directly carried in supported position upon the top tie plate **106** of the center sill **103** and removably secured in place by a pair of longitudinally extending and laterally spaced-apart substantially L-shaped members **122** that are respectively secured, as by welding, to the inner sides of the deck sills **109**, as best shown in FIGS. 7 and 8. The opposite sides of the base plate **121** may be removably secured to the members **122** by removable screws, indicated at **123** in FIG. 8. Also, the hitch **120** comprises a block **124**, a fifth-wheel mechanism **125**, a standard **126** and a strut **127**, as best shown in FIG. 4. More particularly, the block **124** is slidably mounted upon the base plate **121** for longitudinal movements with respect thereto; the lower end of the standard **126** is pivotally connected to the block **124** by an associated pivot pin, as indicated at **128**; and the upper end of the standard **126** is pivotally connected to the central portion of the fifth-wheel mechanism **125** by an associated pivot pin, as indicated at **129**. The rear end of the base plate **121** carries upstanding structure, indicated at **130**; the lower end of the strut **126** is pivotally connected to the structure **130** by an associated pivot pin, as indicated at **131**; and the upper end of the strut **127** is pivotally connected to the central portion of the fifth-wheel mechanism **125** by the pivot pin **129**. In the arrangement, the strut **127** is of composite construction, including a lower cylinder member **132** and an upper piston member **133** that are arranged in telescopic relation with respect to each other for sliding movements therebetween; whereby it is the lower end of the cylinder member **132** that is connected by the pivot pin **131** to the structure **130**, and it is the upper end of the piston **133** that is connected by the pivot pin **129** to the fifth-wheel mechanism **125**. The inner end of the piston **133** arranged within the hollow cylinder **132** comprises a head **134** slidably engaging the interior wall of the hollow piston **132** and cooperates with a pair of compression springs **135** and **136** disposed on opposite sides of the head **134** and respectively cooperating with the opposite ends of the cylinder **132**; all for a purpose more fully explained hereinafter. Further, the central portion of the base plate **121** carries a rotatably mounted actuating shaft **141** that is journaled for rotation in either direction upon longitudinally spaced-apart bearing structures **142** carried upon the top of the base plate **121**; and the rear portion of the actuating shaft **141** is threaded to provide a screw, as indicated at **143**; which screw **143** cooperates with nut structure, not shown, carried by the block **124**.

Considering now the general mode of operation of the hitch **120**, it is noted that it has storage and erected positions with respect to the frame **101** of the railway car **100**. More particularly, when the hitch **120** occupies its storage position, the standard **126** and the strut **127** occupy a folded or contracted position, so that the fifth-wheel mechanism **125** is disposed closely adjacent to the top of the center sill **103** and in non-interfering relation with movements of the road semi-trailer **30** and the road tractor **50**, when they occupy their supported positions upon the top of the frame **101**, as shown in FIG. 1. On the other hand, when the hitch **120** occupies its erected position, the standard **126** and the strut **127** occupy an unfolded or expanded position, so that the fifth-wheel mechanism **125** is disposed well above the top of the center sill **103** and adapted to support the front end of the associated road semi-trailer **30** carried on the top of the frame **101**, as shown in FIG. 2.

More particularly, and referring to FIG. 4, when the actuating shaft **141** is rotated in the clockwise direction, as viewed from the front thereof toward the hitch **120**,

in the bearings 142, the screw 143 moves the block 124 forwardly away from the structure 130; which forward sliding movement of the block 124 upon the base plate 121 moves the hitch 120 from its storage position of FIG. 1 into its erected position of FIG. 2. More particularly, the forward movement of the block 124 pivots the standard 126 out from under the strut 127, with the result that the standard 126 is moved from a substantially horizontal position disposed closely adjacent to the center sill 103 into an upstanding position, as shown in FIG. 4; whereby the strut 127 is also upwardly pivoted about the structure 130, and the fifth-wheel mechanism 125 is elevated into the erected position of FIGS. 2 and 4; whereby the fifth-wheel mechanism 125 in its elevated position is adapted to support the front end of the associated road semi-trailer 30. Furthermore, the fifth-wheel mechanism 125 in its erected position is adapted selectively to latch and to release the king pin 33 carried by the front end of the supported road semi-trailer 30, in the usual manner. In passing, it is mentioned that the structural details of the fifth-wheel mechanism 125 are altogether conventional and have not been illustrated in detail, in the interest of brevity.

On the other hand, when the actuating shaft 141 is rotated in the counterclockwise direction, as viewed from the front thereof toward the hitch 120, in the bearings 142, the screw 143 moves the block 124 rearwardly toward the structure 130; which rearward sliding movement of the block 124 upon the base plate 121 moves the hitch 120 from its erected position of FIG. 2 into its storage position of FIG. 1. More particularly, the rearward movement of the block 124 pivots the standard 126 back under the strut 127, with the result that the standard 126 is moved from its upstanding position, as shown in FIG. 4, into its substantially horizontal position disposed closely adjacent to the center sill 103; whereby the strut 127 is also downwardly pivoted about the structure 130, and the fifth-wheel mechanism 125 is lowered into the storage position of FIG. 1.

When the hitch 120 occupies its erected position of FIGS. 2 and 4 and the fifth-wheel mechanism 125 is operated to latch in place the associated king pin 33 of the supported cooperating road semi-trailer 30, the front end of the road semi-trailer 30 is, of course, supported by the hitch 120 in its erected position, while the rear end of the road semi-trailer 30 is supported upon the frame 101 by the rear road wheels 32, as explained more fully hereinafter. Also, it is noted that during normal operation of the railway car 100, the hitch 120 provides shock-absorption to the connected road semi-trailer 30 by virtue of the arrangement of the compression springs 135 and 136 housed in the strut 127. More particularly, during such normal operation of the railway car 100, the road semi-trailer 30 in its mounted position upon the hitch 120 in its erected position is capable of limited longitudinal movements with respect to the railway car 100; and specifically, the longitudinal movements mentioned of the road semi-trailer 30 are transmitted to the fifth-wheel mechanism 125, thereby to cause the standard 126 in its upstanding position of FIG. 4 to pivot fore-and-aft about the pivot pin 128 with respect to the block 124; whereby the strut 127 is alternately expanded and contracted. More particularly, expansion of the piston 133 with respect to the cylinder 132 of the strut 127 effects compression of the spring 136, while contraction of the piston 133 with respect to the cylinder 132 of the strut 127 effects compression of the spring 135. Accordingly, the longitudinal movements of the road semi-trailer 30 are shocked or damped in the strut 127 by the action of the springs 135 and 136. Moreover, the springs 135 and 136 acting upon the head 134 carried by the piston 133 of the strut 127 cooperate to maintain the standard 126 in its upstanding position, as illustrated in FIG. 4, when the railway car 100 is at rest.

Further, the railway car 100 comprises, as best shown in FIGS. 3, 4, 5, 7 and 8, a hollow substantially T-shaped structure 150, including a longitudinally extending stem 151 mounted upon the center sill 103 and a laterally extending head 152 mounted mutually upon the center sill 103, the side sills 104 and the deck sills 109 and 110. The hollow structure 150 is of composite construction and includes a pair of longitudinally extending and laterally spaced-apart stem members 153 of L-section positioned on opposite sides of the center sill 103 and directly supported respectively on the tops of the deck sills 109, as best shown in FIGS. 3 and 7. Also, the hollow structure 150 includes a laterally extending head member 154 of L-section positioned between the side sills 104 and on top of the elements 106, 109 and 110, as best shown in FIGS. 3, 5 and 7. Also, the hollow structure 150 includes two laterally extending head members 155 of L-section positioned rearwardly of the head member 154 and projecting laterally outwardly from the intermediate portions of the stem members 153, as best shown in FIG. 3, as well as a pair of longitudinally extending and laterally spaced-apart head members 156 of L-section respectively positioned adjacent to the side sills 104 and respectively joining together the outer ends of the head member 154 and the adjacent outer ends of the head members 155. Finally, the hollow structure 150 includes a laterally extending stem member 157 of L-section joining together the rear ends of the stem members 153 and positioned directly upon the top tie plate 106 of the center sill 103.

The two members 153, the single member 154, the two members 155, the two members 156 and the single member 157 are formed of steel and are rigidly secured together, so that the structure 150 as a whole, may be placed and removed with respect to the frame 101 of the railway car 100; moreover, in the composite structure 150, there is defined the longitudinally extending open box 161 in the stem 151 of the structure 150, and also the two laterally spaced-apart open boxes 162 in the head 152 of the structure 150. The structure 150 in its entirety is supported upon the frame 101 of the railway car 100, so that the hitch 120 in its entirety is arranged in the box 161 in the stem 151 and so that the head 152 of the structure 150 is disposed forwardly of the hitch 120, as clearly shown in FIGS. 3 and 5; and furthermore, the structure 150 carries a tread-mill 170 arranged in the boxes 162 in the head 152.

More particularly, the tread-mill 170 comprises front and rear laterally extending and longitudinally spaced-apart shafts 171 and 172 that are suitably journaled in bearings 173 carried by the stem members 153 and by bearings 174 carried by the head members 156; whereby each of the shafts 171 and 172 is mounted for rotation in either direction upon the head 152 of the structure 150. The opposite ends of the front shaft 171 carry a pair of outer rollers 175 and a pair of inner rollers 175' arranged in the two laterally spaced-apart boxes 162 provided in the head 152 of the structure 150; and likewise, the opposite ends of the rear shaft 172 carry a pair of outer rollers 176 and a pair of inner rollers 176' arranged in the two laterally spaced-apart boxes 162 provided in the head 152 of the structure 150. In the arrangement, the two rollers 175 and 175' disposed in each of the boxes 162 are separated laterally from each other by an associated bearing 177 that is supported upon the adjacent deck sill 110, as shown in FIG. 5; likewise, the two rollers 176 and 176' disposed in each of the boxes 162 are separated laterally from each other by an associated bearing 178 that is supported upon the adjacent deck sill 110, as shown in FIGS. 5 and 7. Accordingly, in the arrangement, in each of the boxes 162, the outer rollers 175 and 176 are arranged in longitudinal alignment wtih each other and are adapted to engage and to support the outer road wheel 53 of the road tractor 50, and the inner rollers 175' and 176' are arranged in longitudinal alignment with each other and are adapted to engage and to support the inner road wheel 53' of the

road tractor 50; all as indicated in FIG. 7. In order to improve the frictional contact between the rollers 176 and 176' and the supported road wheels 53 and 53' of the road tractor 50, the outer surfaces of the rollers 176 and 176' are serrated or knurled, as indicated in FIG. 7.

The rear shaft 172 has rigidly affixed thereto a beveled gear 181 that is arranged to mesh a beveled gear 182 that is rigidly secured to the extreme front end of the actuating shaft 141, as shown in FIG. 5. Moreover, the upper portion of the stem 151 and the intermediate portion of the head 152 of the composite structure 150 is provided with a cover plate 183 that may be suitably secured in place by screws, indicated at 184 in FIG. 5.

Also the structure 150 carries lock mechanism for the purpose of selectively locking the shafts 171 and 172 against rotation in either direction; and as illustrated in FIGS. 5 and 6, the arrangement comprises two locking pawls 185 and 186 that are respectively carried by the lower head member 156, as shown in FIG. 5, and arranged to cooperate with two ratchet wheels 187 and 188 respectively rigidly secured to the outer ends of the respective shafts 171 and 172. As shown in FIG. 6, the locking pawl 185 is pivotally mounted upon a pivot pin 189 and carried by the head member 156 and arranged selectively to lock the associated ratchet wheel 187 that is rigidly secured to the extreme outer end of the shaft 171 by a key 190. In FIG. 6, the locking pawl 185 is shown in solid lines in its locking position with respect to the ratchet wheel 187 and is illustrated in dotted lines in its unlocking position with respect to the ratchet wheel 187.

Accordingly, it will be understood that the tread-mill 170 is adapted removably to support the rear drive wheels 53 and 53' of the road tractor 50 and selectively to trap the road drive wheels 53 and 53' in supported positions between the rollers 175, 176 and 175', 176' depending upon the positions of the locking pawls 185 and 186 with respect to the associated ratchet wheels 187 and 188. More particularly, when the locking pawls 185 and 186 occupy their locking positions with respect to their ratchet wheels 187 and 188, the shafts 171 and 172 are locked against rotation in either direction; whereby it will be understood that the rear drive wheels 53 and 53' of the road tractor 50 may readily roll along the frame 101 of the railway car 100 and across the rollers 175, 176 and 175', 176' without being trapped in the tread-mill 170. On the other hand, when the locking pawls 185 and 186 occupy their unlocking positions with respect to their ratchet wheels 187 and 188, the shafts 171 and 172 are unlocked for rotation in either direction; whereby it will be understood that the rear drive wheels 53 and 53' of the road tractor 50 will fall into trapped relation with respect to the rollers 175, 176 and 175', 176' incident to movement of the road tractor 50 along the frame 101 of the railway car 100; whereby in this case, the drive wheels 53 and 53' are supported in the tread-mill 170 in frictional engagements with the rollers 175, 176 and 175', 176'.

Considering now the operation of the tread-mill 170, when the supported drive wheels 53 and 53' of the road tractor 50 are rotated in the forward direction, the rollers 175, 176 and 175', 176' in frictional engagement therewith are rotated in the reverse direction; and conversely, when the supported drive wheels 53 and 53' of the road tractor 50 are rotated in the reverse direction, lers 175, 176 and 175', 176' in frictional engagement ment therewith are rotated in the forward direction. Rotation of the rollers 176 and 176' in the clockwise direction, as viewed from the lower side rail 104 in FIG. 5, effects corresponding rotation of the beveled gear 181 carried by the rear shaft 172 and the consequent rotation of the actuating shaft 141 in the clockwise direction, as viewed from the front end thereof in FIG. 5; on the other hand, rotation of the rollers 176 and 176' in the counterclockwise direction effects corresponding rotation of the beveled gear 181 carried by the rear shaft 172 and the consequent rotation of the actuating shaft 141 in the counterclockwise direction. As previously explained, clockwise rotation of the actuating shaft 141 effects movement of the hitch 120 from its storage position of FIG. 1 into its erected position of FIG. 2, while counterclockwise rotation of the actuating shaft 141 effects movement of the hitch 120 from its erected position of FIG. 2 into its storage position of FIG. 1.

Accordingly, it will be understood that when the rear drive wheels 53 and 53' of the road tractor 50 occupy their supported and trapped positions in the tread-mill 170, selective rotations of the drive wheels 53 and 53' in opposite directions effect selective operations of the hitch 120 between its storage and erected positions, as explained above.

Continuing now with the construction and arrangement of the railway car 100 and referring particularly to FIGS. 3 and 8, it is noted that the frame 101 supports a composite deck arranged in upper and lower sections 195 and 196, as shown in FIG. 3. More particularly, each of the deck sections 195 and 196 comprises a plurality of individual floor timbers extending laterally across the cooperating deck sills 109 and 110, the individual floor timbers being disposed in longitudinally spaced-apart relation. The outer end of each of the deck timbers is carried by a longitudinally extending deck member 197 that is rigidly secured to the adjacent side sill 104, as best shown in FIG. 8; while the inner end of each of the deck timbers is spaced outwardly a short distance from the adjacent edge of the top tie plate 106 of the center sill 103, as shown in FIG. 8. In the arrangement, the top of the structure 150 is disposed slightly above the plane of the top of the deck sections 195 and 196; whereby four inclined ramps 198 are carried upon the adjacent portions of the deck sections 195 and 196 and arranged on either side of the opposite arms of the head 152 of the composite structure 150, as shown in FIG. 3, thereby to accommodate the transfer or transition of the road wheels 32 of the semi-trailer 30 and the road wheels 52 and 53, 53' of the road tractor 50 across the tread-mill 170.

Considering now the loading of the road semi-trailer 30 upon the railway car 100, the road semi-trailer 30 is coupled in the usual manner to the fifth-wheel mechanism 54 of the road tractor 50, and the road semi-trailer 30 and the road tractor 50 are backed as a unit across an associated ramp, not shown, onto the left-hand end of the railway car 100 and thence onto the right-hand end thereof, as shown in FIG. 1. At this time, it may be assumed that the shafts 171 and 172 of the tread-mill 170 occupy their locked positions, so as to prevent trapping of the road wheels 32 of the road semi-trailer 30 and the rear drive wheels 53 and 53' of the road tractor 50 in the tread-mill 170, as previously explained. Furthermore, at this time, it is, of course, assumed that the hitch 120 occupies its storage position of FIG. 1 and that the front landing gear 34 of the road semi-trailer 30 occupies its upper position, as illustrated in FIG. 1. In the loading operation, the semi-trailer 30 is backed longitudinally along the deck sections 195 and 196 carried by the frame 101 of the railway car 100 with the road wheels 32 supported thereby and across the tread-mill 170 and into the position, as shown in FIG. 1; whereupon the front landing gear 34 of the road semi-trailer 30 is operated into its lowered position, indicated by the broken lines in FIG. 1, so as to support the front end of the road semi-trailer 30 independently of the fifth-wheel mechanism 54 carried by the rear end of the road tractor 50. Also, at this time, the king pin 33 carried by the front end of the road semi-trailer 30 is disposed longitudinally of the railway car 100, so that when the hitch 120 is actuated into its erected position of FIG. 2, the fifth-wheel mechanism 125 thereof will engage the king pin 33. At this time, the fifth-wheel mechanism 54 is actuated to release the king pin 33 and

the road tractor 50 is driven forwardly along the railway car 100 into its position of FIG. 2, so that the road wheels 53 and 53' thereof are trapped in the tread-mill 170. The locking mechanisms associated with the shafts 171 and 172 are operated into their unlocking positions, and the rear drive wheels 53 and 53' of the road tractor 50 are operated in the forward direction, so as to operate the tread-mill 170 in order to cause the hitch 120 to be actuated from its storage position of FIG. 1 into its erected position of FIG. 2; whereby the fifth-wheel mechanism 125 of the hitch 120 is operated into supporting relation with respect to the front end of the road semi-trailer 30 and to receive and to latch in place the king pin 33 carried by the front end of the road semi-trailer 30. At this time, the front landing gear 34 is operated into its upper position and the locking mechanisms are returned into their locking positions with respect to the associated shafts 171 and 172; whereupon the rear drive wheels 53 and 53' of the road tractor 50 may be rotated in the forward direction, so as to drive the road tractor 50 out of trapped relation with respect to the tread-mill 170, with the result that the road tractor 150 may then be driven forwardly longitudinally along the deck sections 195 and 196 and off of the left-hand end of the railway car 100 and across the connecting ramp back into the terminal yard, in an obvious manner.

Considering now the unloading of the road semi-trailer 30 from the railway car 100, the front landing gear 34 of the road semi-trailer is operated into its lower position in order to support the front end thereof independently of the hitch 120 and the fifth-wheel mechanism 125 is operated to release the king pin 33 carried by the front end of the road semi-trailer. Then the road tractor 50 is backed onto the left end of the railway car 100 and longitudinally therealong into the position of FIG. 2. At this time, the drive wheels 53 and 53' of the road tractor 50 are trapped in the tread-mill 170 and the locking mechanisms are operated to unlock the shafts 171 and 172. At this time, the drive wheels 53 and 53' of the road tractor 50 are rotated in the reverse direction in order to operate the tread-mill 170 so as to move the hitch 120 from its erected position of FIG. 2 into its storage position of FIG. 1; whereby the front end of the road semi-trailer 30 is then supported by the front landing gear 34. The locking mechanisms associated with the shafts 171 and 172 of the tread-mill 170 are returned into their locked positions, and further rearward rotations of the drive wheels 53 and 53' are effected, so that the road tractor 50 is backed out of the tread-mill 170, with the result that the fifth-wheel mechanism 54 is positioned below and in supporting relation with respect to the front end of the road semi-trailer 30. Moreover, the fifth-wheel mechanism 54 is actuated to latch the king pin 33 in place. At this time, the front landing gear 34 is returned into its upper position; whereby the support of the front end of the road semi-trailer 30 is through the fifth-wheel mechanism 54 carried on the rear end of the road tractor 50. The road tractor 50 is then driven forwardly off of the left-hand end of the railway car 100, drawing the coupled road semi-trailer 30 therewith; whereupon the road tractor 50 and the road semi-trailer 30 are moved across the adjacent ramp and into the associated terminal yard, in an obvious manner.

In these operations, it is noted that a plurality of the railway cars 100 are normally loaded and unloaded in a coupled string; whereby it will be understood that suitable bridging structures, not shown, are provided between the deck sections 195 and 196 at the adjacent coupled ends of the railway cars 100 so as to accommodate longitudinal rolling movements of the road tractor 50 and the road semi-trailers 30 longitudinally along the coupled railway cars 100. Moreover, the string of railway cars 100 are always loaded from the rear of the string toward the front thereof, and each railway car is normally loaded with two of the road semi-trailers 30. In the loading of each railway car 100, one of the road semi-trailers 30 is first loaded upon the rear end thereof and then another of the road semi-trailers 30 is loaded upon the front end thereof. Moreover, it will be understood that in each of the railway cars 100, each of the hitches 120 normally occupies its storage position until use thereof is to be made in supporting the front end of the cooperating road semi-trailer 30; which arrangement of the hitches 120 in their storage positions is necessary in order to prevent interference with the longitudinal traffic along the coupled railway cars 100 of the road semi-trailers 30 and the road tractor 50.

Furthermore, it will be understood that each of the two hitches 120 carried by each of the railway cars 100 may be readily operated in the manner previously explained by the associated one of the tread-mills 170, utilizing the very road tractor 50 that is employed in the loading of the road semi-trailers 30 upon the railway car 100; whereby no other auxiliary equipment whatsoever is required, for the selective operation of the two hitches carried by the railway car 100 between their storage and erected positions as required, by virtue of the provision of the two respectively associated tread-mills 170 that are directly carried by the frame 101 of the railway car 100. Moreover, these tread-mills 170 may be selectively operated by the driver of the road tractor 50 in a straightforward and simple manner that is, in no way, dissimilar to the normal driving operations involved in the driving of the road tractor 50. Accordingly, the loading and unloading of the railway car 100 may be readily effected at a small freight terminal and at a railway siding in a ready manner, without the necessity of auxiliary equipment of any kind.

In view of the foregoing, it is apparent that there has been provided a railway car that is especially adapted for the transportation of road semi-trailers and that incorporates improved road tractor operated mechanism for selectively actuating the road semi-trailer hitches carried by the railway car, as required, in the loading and unloading of the road semi-trailers with respect to the railway car.

While there has been described what is at present considered to be the preferred embodiment of the invention, it will be understood that various modifications may be made therein, and it is intended to cover in the appended claims all such modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. A railway car for transporting a road semi-trailer; said railway car comprising a longitudinally extending frame adapted to support and to accommodate longitudinal movements therealong of a road semi-trailer and of a road tractor, a hitch mounted upon said frame for movements between storage and erected positions with respect thereto, said hitch in its storage position being disposed closely adjacent to the top of said frame and in non-interfering relation with movements of a road semi-trailer and of a road tractor both carried on the top of said frame, said hitch in its erected position being disposed well above the top of said frame and being adapted to support the front end of a road semi-trailer carried on the top of said frame, said hitch including a fifth-wheel mechanism that is adapted selectively to latch and to release the king pin carried by the front end of a road semi-trailer supported by said hitch in its erected position, a tread-mill mechanism mounted upon said frame and oriented laterally thereon so that it is adapted removably to support the drive wheels of a road tractor carried on the top of said frame, said tread-mill mechanism including a roller adapted frictionally to engage the drive wheels of the supported road tractor, whereby selective forward and reverse rotations of the drive wheels of the supported road tractor impart respectively corresponding reverse and forward rotations to said roller, and actuating mechanism oper-

atively connected between said roller and said hitch for selectively moving said hitch between its storage and erected positions, said actuating mechanism being responsive to rotation of said roller in one direction to move said hitch from its storage position into its erected position and responsive to rotation of said roller in the opposite direction to move said hitch from its erected position into its storage position.

2. The railway car set forth in claim 1, and further comprising means for selectively locking said roller against rotation, thereby to accommodate ready passage of the drive wheels of a supported road tractor longitudinally along the top of said frame and across said tread-mill mechanism without rotation of said roller in its locked position.

3. A railway car for transporting a road semi-trailer; said railway car comprising a longitudinally extending frame adapted to support and to accommodatae longitudinal movements therealong of a road semi-trailer and of a road tractor, a hitch mounted upon said frame for movements between storage and erected positions with respect thereto, said hitch in its storage position being disposed closely adjacent to the top of said frame and in non-interfering relation with movements of a road semi-trailer and of a road tractor both carried on the top of said frame, said hitch in its erected position being disposed well above the top of said frame and being adapted to support the front end of a road semi-trailer carried on the top of said frame, said hitch including a fifth-wheel mechanism that is adapted selectively to latch and to release the king pin carried by the front end of a road semi-trailer supported by said hitch in its erected position, a tread-mill mechanism mounted upon said frame and oriented laterally thereon so that it is adapted removably to support the drive wheels of a road tractor carried on the top of said frame, said tread-mill mechanism including a pair of laterally extending and longitudinally spaced-apart rollers adapted to trap therebetween the drive wheels of a supported road tractor incident to longitudinal movement thereof along the top of said frame and across said tread-mill mechanism, locking mechanism cooperating with said rollers and having locked and unlocked positions, said locking mechanism in its locked position restraining said rollers against rotation so as to accommodate ready passage of the drive wheels of a supported road tractor longitudinally along the top of said frame without rotation of said rollers, said locking mechanism in its unlocked position releasing said rollers for rotation by the trapped drive wheels of a supported road tractor, whereby selective forward and reverse rotations of the trapped drive wheels of a supported road tractor impart respectively corresponding reverse and forward rotations to one of said rollers, and actuating mechanism operatively connected between said one roller and said hitch for selectively moving said hitch between its storage and erected positions, said actuating mechanism being responsive to rotation of said roller in one direction to move said hitch from its storage position into its erected position and responsive to rotation of said roller in the opposite direction to move said hitch from its erected position into its storage position.

4. A railway car for transporting a road semi-trailer; said railway car comprising a longitudinally extending frame adapted to support and to accommodate longitudinal movements therealong of a road semi-trailer and of a road tractor, a hitch mounted upon said frame for movements between storage and erected positions with respect thereto, said hitch in its storage position being disposed closely adjacent to the top of said frame and in non-interfering relation with movements of a road semi-trailer and of a road tractor both carried on the top of said frame, said hitch in its erected position being disposed well above the top of said frame and being adapted to support the front end of a road semi-trailer carried on the top of said frame, said hitch including a fifth-wheel mechanism that is adapted selectively to latch and to release the king pin carried by the front end of a road semi-trailer supported by said hitch in its erected position, said hitch also including actuating mechanism for selectively moving the same between its storage and erected positions, said actuating mechanism including a rotatably mounted shaft that is rotatable in one direction to effect movement of said hitch from its storage position into its erected position and that is rotatable in the other direction to effect movement of said hitch from its erected position into its storage position, a tread-mill mechanism mounted upon said frame and oriented laterally thereon so that it is adapted removably to support the drive wheels of a road tractor carried on the top of said frame, said tread-mill mechanism including a roller adapted frictionally to engage the drive wheels of the supported road tractor, whereby selective forward and reverse rotations of the drive wheels of the supported road tractor impart respectively corresponding reverse and forward rotations to said roller, and a drive connection between said roller and said shaft, whereby rotation of said roller in a given direction effects rotation of said shaft in said one direction and the consequent movement of said hitch from its storage position into its erected position and rotation of said roller in the opposite direction effects rotation of said shaft in said other direction and the consequent movement of said hitch from its erected position into its storage position.

5. A railway car for transporting a road semi-trailer; said railway car comprising a longitudinally extending frame adapted to support and to accommodate longitudinal movements therealong of a road semi-trailer and of a road tractor, said frame including a longitudinally extending center sill and a pair of longitudinally extending and laterally spaced-apart side sills, a hitch mounted upon said center sill for movements between storage and erected positions with respect thereto, said hitch in its storage position being disposed closely adjacent to the top of said frame and in non-interfering relation with movements of a road semi-trailer and of a road tractor both carried on the top of said frame, said hitch in its erected position being disposed well above the top of said frame and being adapted to support the front end of a road semi-trailer carried on the top of said frame, said hitch including a fifth-wheel mechanism that is adapted selectively to latch and to release the king pin carried by the front end of a road semi-trailer supported by said hitch in its erected position, a tread-mill mechanism mounted mutually upon said center sill and upon said side sills and oriented laterally thereon so that it is adapted removably to support the drive wheels of a road tractor carried on the top of said frame, said tread-mill mechanism including a roller adapted frictionally to engage the drive wheels of the supported road tractor, whereby selective forward and reverse rotations of the drive wheels of the supported road tractor impart respectively corresponding reverse and forward rotations to said roller, and actuating mechanism operatively connected between said roller and said hitch for selectively moving said hitch between its storage and erected positions, said actuating mechanism being responsive to rotation of said roller in one direction to move said hitch from its storage position into its erected position and responsive to rotation of said roller in the opposite direction to move said hitch from its erected position into its storage position.

6. A railway car for transporting a road semi-trailer; said railway car comprising a longitudinally extending frame adapted to support and to accommodate longitudinal movements therealong of a road semi-trailer and of a road tractor, said frame including a longitudinally extending center sill and a pair of longitudinally extending and laterally spaced-apart side sills, a hollow substantially T-shaped structure including a longitudinally extending stem mounted upon said center sill and a laterally

extending head mounted mutually upon said center sill and upon said side sills, a hitch arranged in the stem of said structure and mounted upon said center sill for movements between storage and erected positions with respect to said center sill, said hitch in its storage position being disposed closely adjacent to the top of said frame and in non-interfering relation with movements of a road semi-trailer and of a road tractor both carried on the top of said frame, said hitch in its erected position being disposed well above the top of said frame and being adapted to support the front end of a road semi-trailer carried on the top of said frame, said hitch including a fifth-wheel mechanism that is adapted selectively to latch and to release the king pin carried by the front end of a road semi-trailer supported by said hitch in its erected position, a pair of laterally extending and longitudinally spaced-apart rollers arranged in the head of said structure and journalled for rotation thereupon, said rollers being adapted to trap therebetween the drive wheels of a supported road tractor incident to longitudinal movement thereof along the top of said frame and across said rollers, locking mechanism cooperating with said rollers and having locked and unlocked positions, said locking mechanism in its locked position restraining said rollers against rotation so as to accommodate ready passage of the drive wheels of a supported road tractor longitudinally along the top of said frame without rotation of said rollers, said locking mechanism in its unlocked position releasing said rollers for rotation by the trapped drive wheels of a supported road tractor, whereby selective forward and reverse rotations of the trapped drive wheels of a supported road tractor impart respectively corresponding reverse and forward rotations to one of said rollers, and actuating mechanism arranged in the stem of said structure and operatively connected between said one roller and said hitch for selectively moving said hitch between its storage and erected positions, said actuating mechanism being responsive to rotation of said roller in one direction to move said hitch from its storage position into its erected position and responsive to rotation of said roller in the opposite direction to move said hitch from its erected position into its storage position.

7. A railway car for transporting a road semi-trailer; said railway car comprising a longitudinally extending frame adapted to support and to accommodate longitudinal movements therealong of a road semi-trailer and of a road tractor, said frame including a longitudinally extending center sill and a pair of longitudinally extending and laterally spaced-apart side sills, a hollow substantially T-shaped structure including a longitudinally extending stem mounted upon said center sill and a laterally extending head mounted mutually upon said center sill and upon said side sills, a deck provided on the top of said frame and generally surrounding said structure and adapted directly to support the road wheels of a road semi-trailer and of a road tractor carried upon the top of said frame, a hitch arranged in the stem of said structure and mounted upon said center sill for movements between storage and erected positions with respect to said center sill, said hitch in its storage position being disposed closely adjacent to the top of said frame and in non-interfering relation with movements of a road semi-trailer and of a road tractor both carried on the top of said frame, said hitch in its erected position being disposed well above the top of said frame and being adapted to support the front end of a road semi-trailer carried on the top of said frame, said hitch including a fifth-wheel mechanism that is adapted selectively to latch and to release the king pin carried by the front end of a road semi-trailer supported by said hitch in its erected position, a pair of laterally extending and longitudinally spaced-apart rollers arranged in the head of said structure and journalled for rotation thereupon, said rollers being adapted to trap therebetween the drive wheels of a supported road tractor incident to longitudinal movement thereof along the top of said frame and across said rollers, the upper surface of the head of said structure being disposed in a plane positioned somewhat above the plane of said deck, two laterally spaced-apart pairs of ramps carried by said deck and respectively cooperating with the opposite sides of the head of said structure and accommodating the support of the road wheels of a road semi-trailer and of a road tractor incident to transfer thereof between said deck and said rollers, locking mechanism cooperating with said rollers and having locked and unlocked positions, said locking mechanism in its locked position restraining said rollers against rotation so as to accommodate ready passage of the drive wheels of a supported road tractor longitudinally along the top of said frame without rotation of said rollers, said locking mechanism in its unlocked position releasing said rollers for rotation by the trapped drive wheels of a supported road tractor, whereby selective forward and reverse rotations of the trapped drive wheels of a supported road tractor impart respectively corresponding reverse and forward rotations to one of said rollers, and actuating mechanism arranged in the stem of said structure and operatively connected between said one roller and said hitch for selectively moving said hitch between its storage and erected positions, said actuating mechanism being responsive to rotation of said roller in one direction to move said hitch from its storage position into its erected position and responsive to rotation of said roller in the opposite direction to move said hitch from its erected position into its storage position.

8. A railway car for transporting a road semi-trailer; said railway car comprising a longitudinally extending frame adapted to support and to accommodate longitudinal movements therealong of a road semi-trailer and of a road tractor, a hitch including a base plate mounted upon said frame, said hitch also including a fifth-wheel mechanism and vertically movable structure interconnecting said base plate and said fifth-wheel mechanism, said structure mounting said fifth-wheel mechanism for selective movements between storage and erected positions with respect to said frame, raising of said structure effecting movement of said fifth-wheel mechanism from its storage position into its erected position and lowering of said structure effecting movement of said fifth-wheel mechanism from its erected position into its storage position, said fifth-wheel mechanism in its storage position being disposed closely adjacent to the top of said frame and in non-interfering relation with movements of a road semi-trailer and of a road tractor both carried on the top of said frame, said fifth-wheel mechanism in its erected position being disposed well above the top of said frame and being adapted to support the front end of a road semi-trailer carried on the top of said frame, said fifth-wheel mechanism being adapted selectively to latch and to release the king pin carried by the front end of a road semi-trailer supported thereby in its erected position, a tread-mill mechanism mounted upon said frame and oriented laterally thereon so that it is adapted removably to support the drive wheels of a road tractor carried on the top of said frame, said tread-mill mechanism including a roller adapted frictionally to engage the drive wheels of the supported road tractor, whereby selective forward and reverse rotations of the drive wheels of the supported road tractor impart respectively corresponding reverse and forward rotations to said roller, and actuating mechanism operatively connected between said roller and said structure for selectively raising and lowering said structure, said actuating mechanism being responsive to rotation of said roller in one direction to raise said structure and being responsive to rotation of said roller in the opposite direction to lower said structure.

9. A railway car for transporting a road semi-trailer; said railway car comprising a longitudinally extending

frame adapted to support and to accommodate longitudinal movements therealong of a road semi-trailer and of a road tractor, a hitch including a base plate mounted upon said frame and a block mounted for longitudinal sliding movements upon said base plate, said hitch also including a fifth-wheel mechanism and a strut and a standard, the lower end of said strut being pivotally connected to said base plate rearwardly of said block and the upper end of said strut being pivotally connected to said fifth-wheel mechanism, the lower end of said standard being pivotally connected to said block and the upper end of said standard being pivotally connected to said fifth-wheel mechanism, rearward sliding movement of said block upon said base plate effecting folding of said strut and said standard toward said base plate with the consequent movement of said fifth-wheel mechanism into a storage position disposed closely adjacent to the top of said frame and in non-interfering relation with movements of a road semi-trailer and of a road tractor both carried on the top of said frame, forward sliding movement of said block upon said base plate effecting unfolding of said strut and said standard away from said base plate with the consequent movement of said fifth-wheel mechanism into an erected position disposed well above the top of said frame and adapted to support the front end of a road semi-trailer carried on the top of said frame, said fifth-wheel mechanism being adapted selectively to latch and to release the king pin carried by the front end of a road semi-trailer supported thereby in its erected position, said hitch also including a longitudinally extending shaft rotatably mounted upon said base plate, said shaft including a screw-section disposed in threaded engagement with nut-structure carried by said block, whereby rotation of said shaft in one direction imparts forward sliding movement to said block upon said base plate with the resulting movement of said fifth-wheel mechanism from its storage position into its erected position and rotation of said shaft in the opposite direction imparts rearward sliding movement to said block upon said base plate with the resulting movement of said fifth-wheel mechanism from its erected position into its storage position, a tread-mill mechanism mounted upon said frame and oriented laterally thereon so that it is adapted removably to support the drive wheels of a road tractor carried on the top of said frame, said tread-mill mechanism including a roller adapted frictionally to engage the drive wheels of the supported road tractor, whereby selective forward and reverse rotations of the drive wheels of the supported road tractor impart respectively corresponding reverse and forward rotations to said roller, and a drive connection between said roller and said shaft, whereby rotation of said roller in one direction rotates said shaft in said one direction and rotation of said roller in the opposite direction rotates said shaft in said opposite direction.

No references cited.