

Dec. 6, 1966

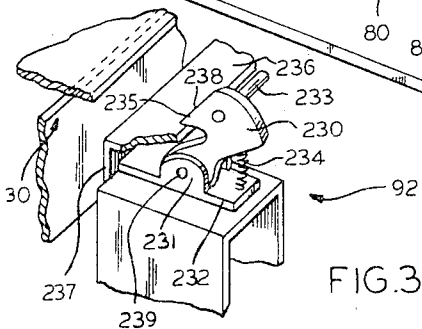
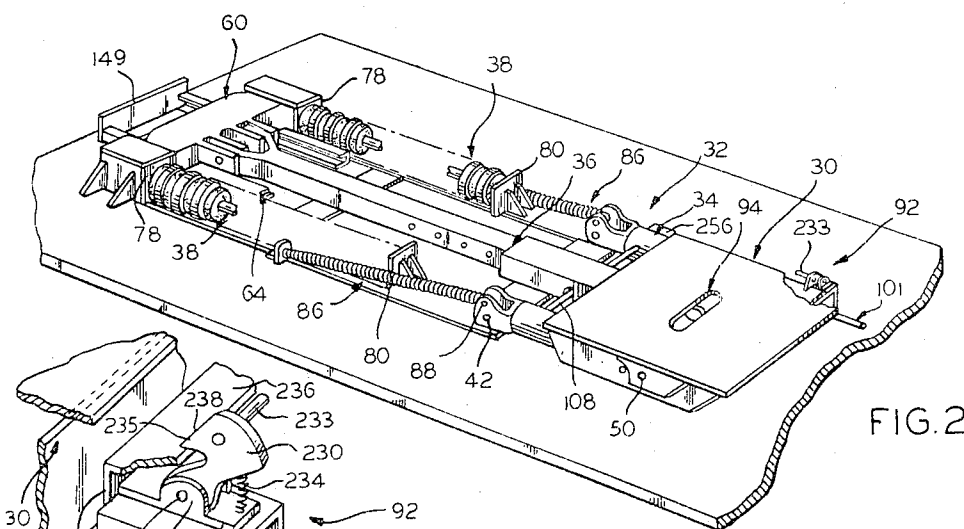
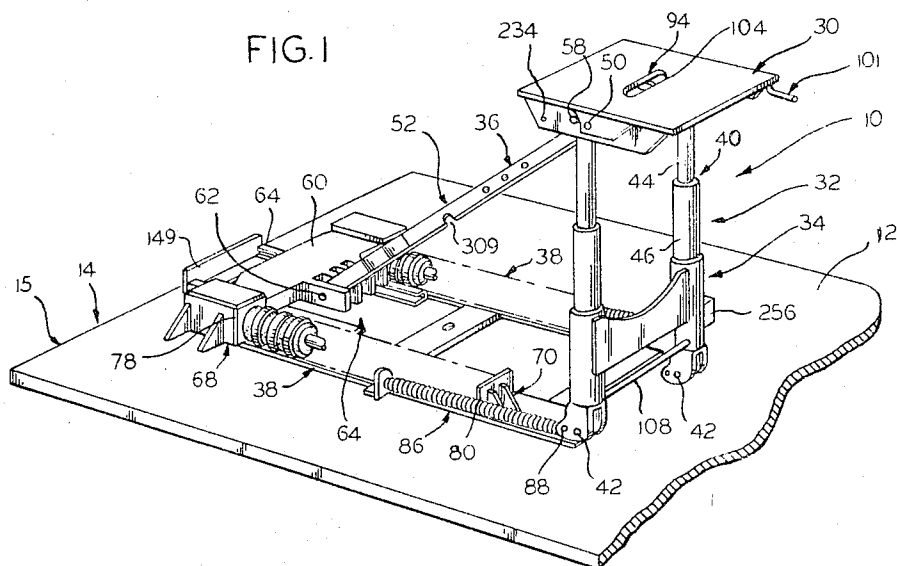
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3,289,987

FIFTH WHEEL STAND FOR RAILROAD CARS

Original Filed May 4, 1960

9 Sheets-Sheet 1



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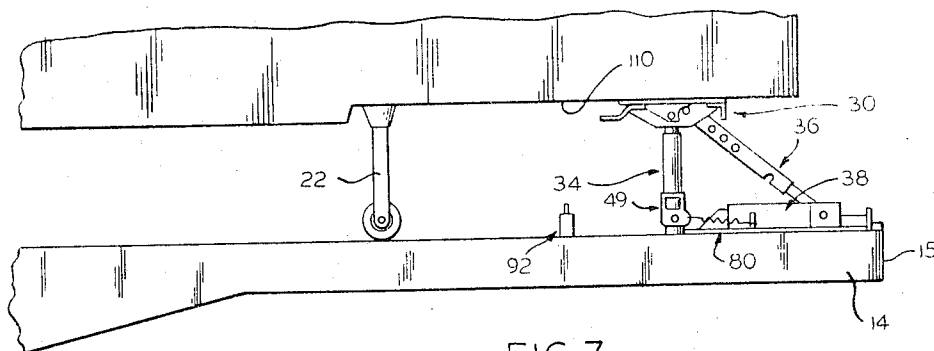


FIG. 7

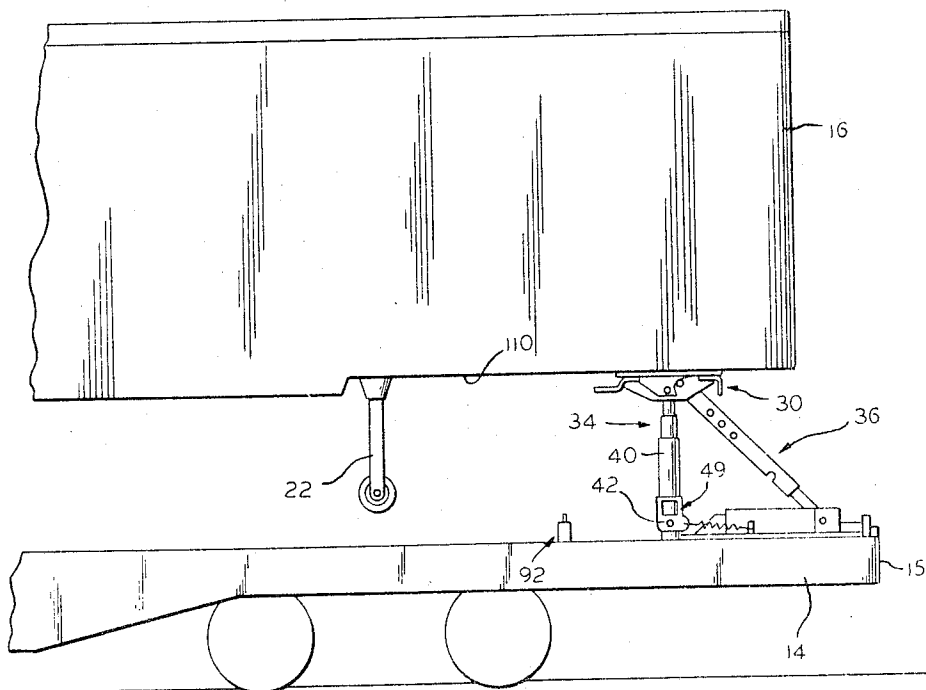


FIG. 8

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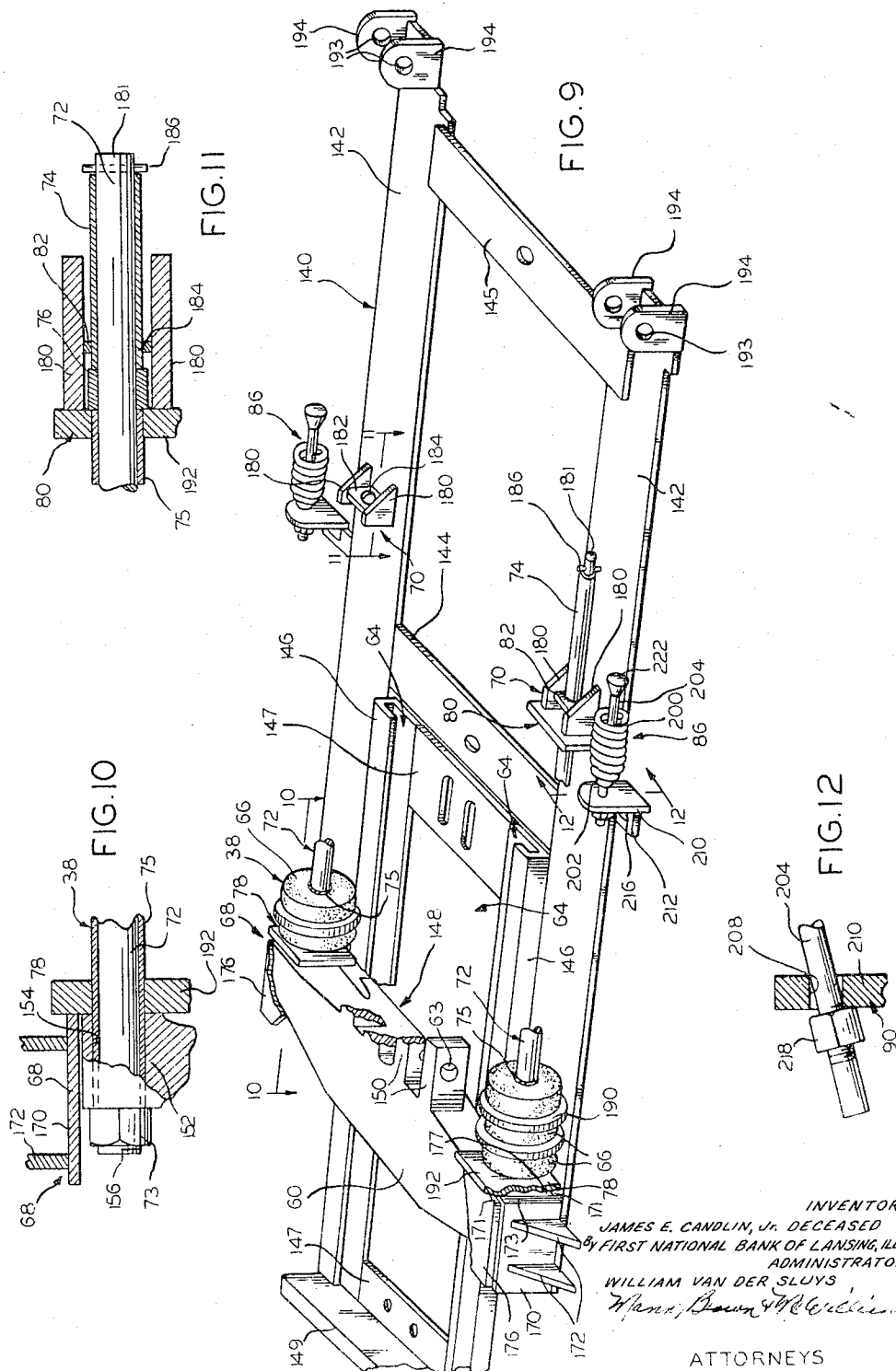
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FIFTH WHEEL STAND FOR RAILROAD CARS

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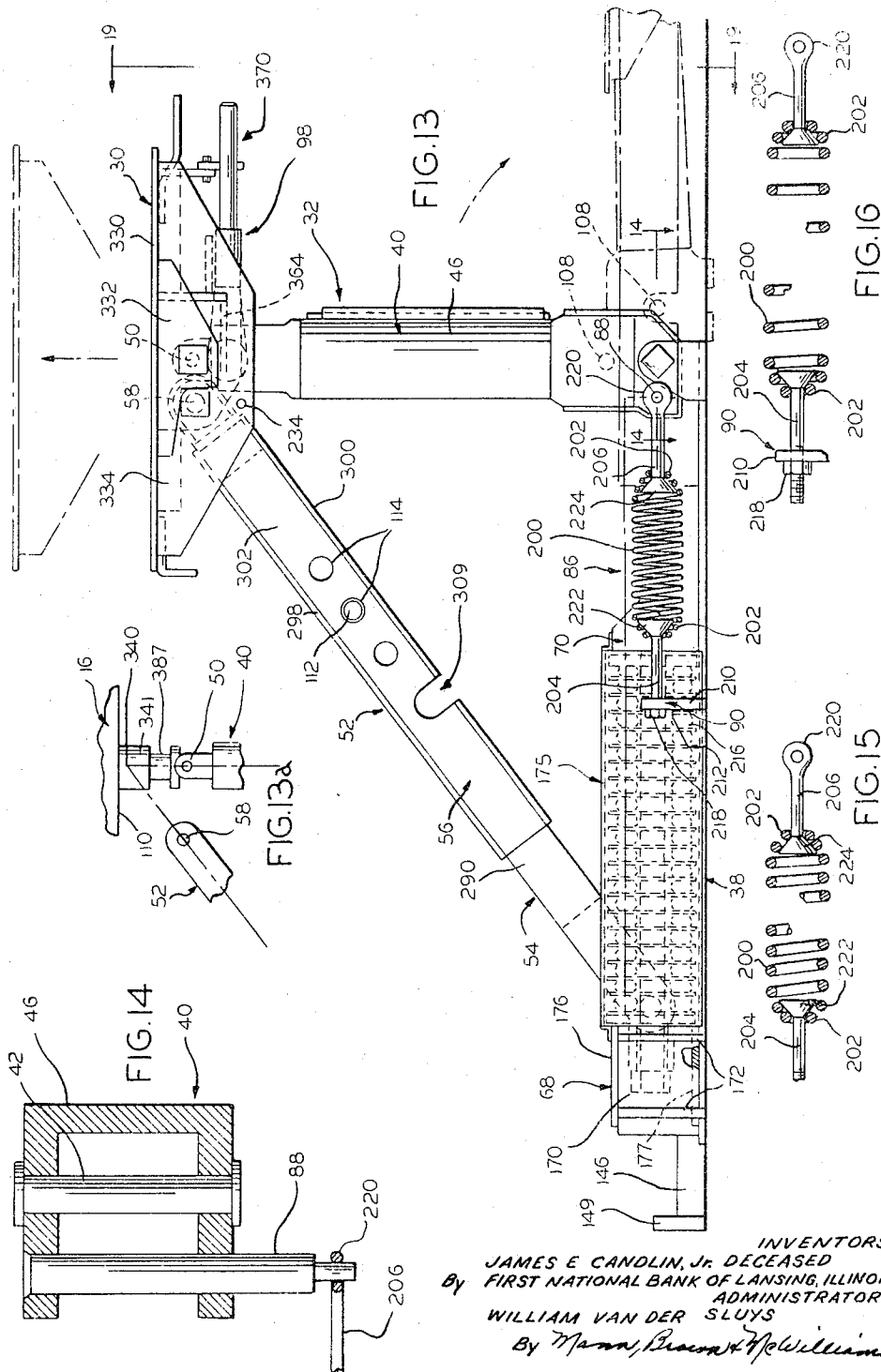
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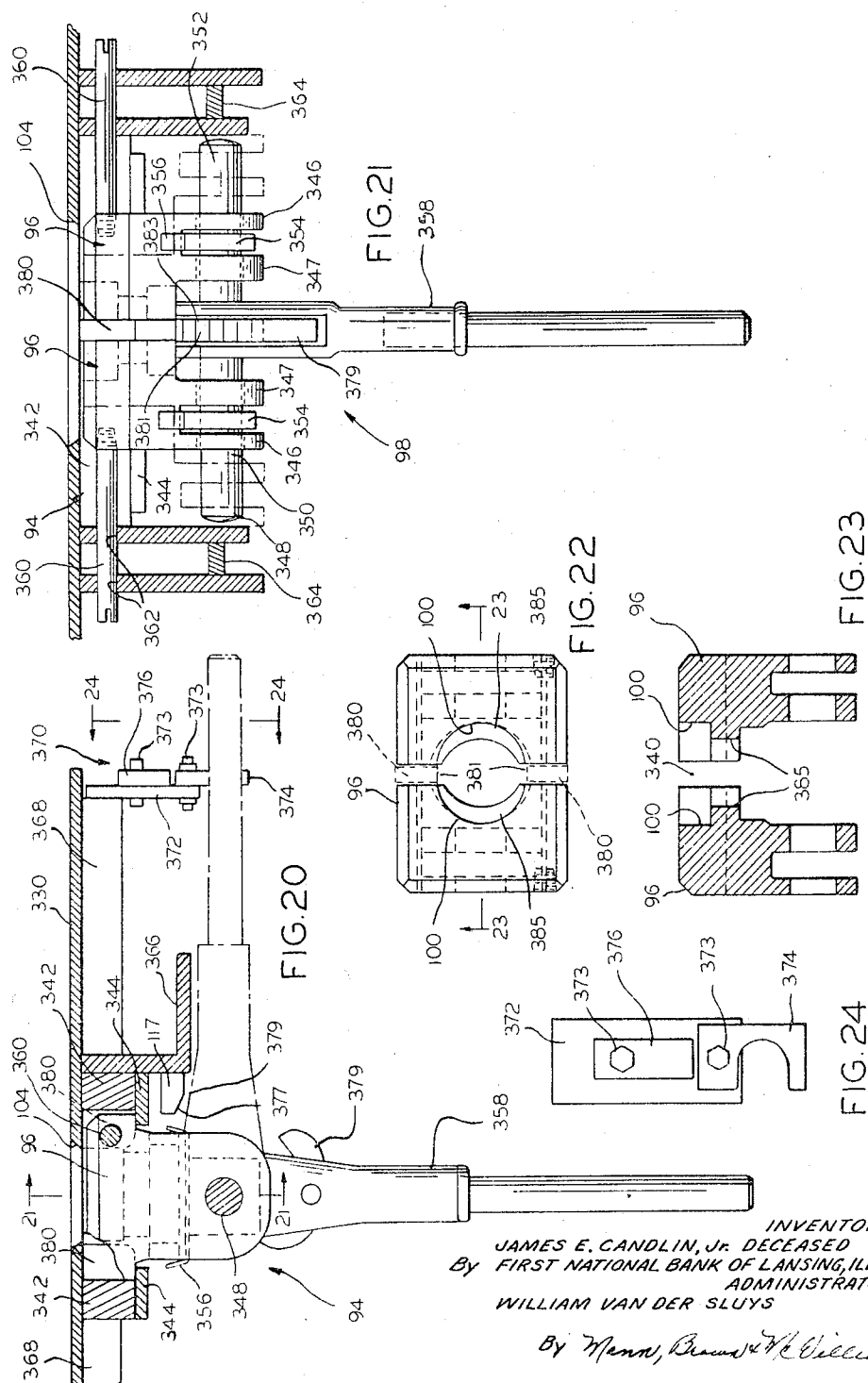
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FIFTH WHEEL STAND FOR RAILROAD CARS

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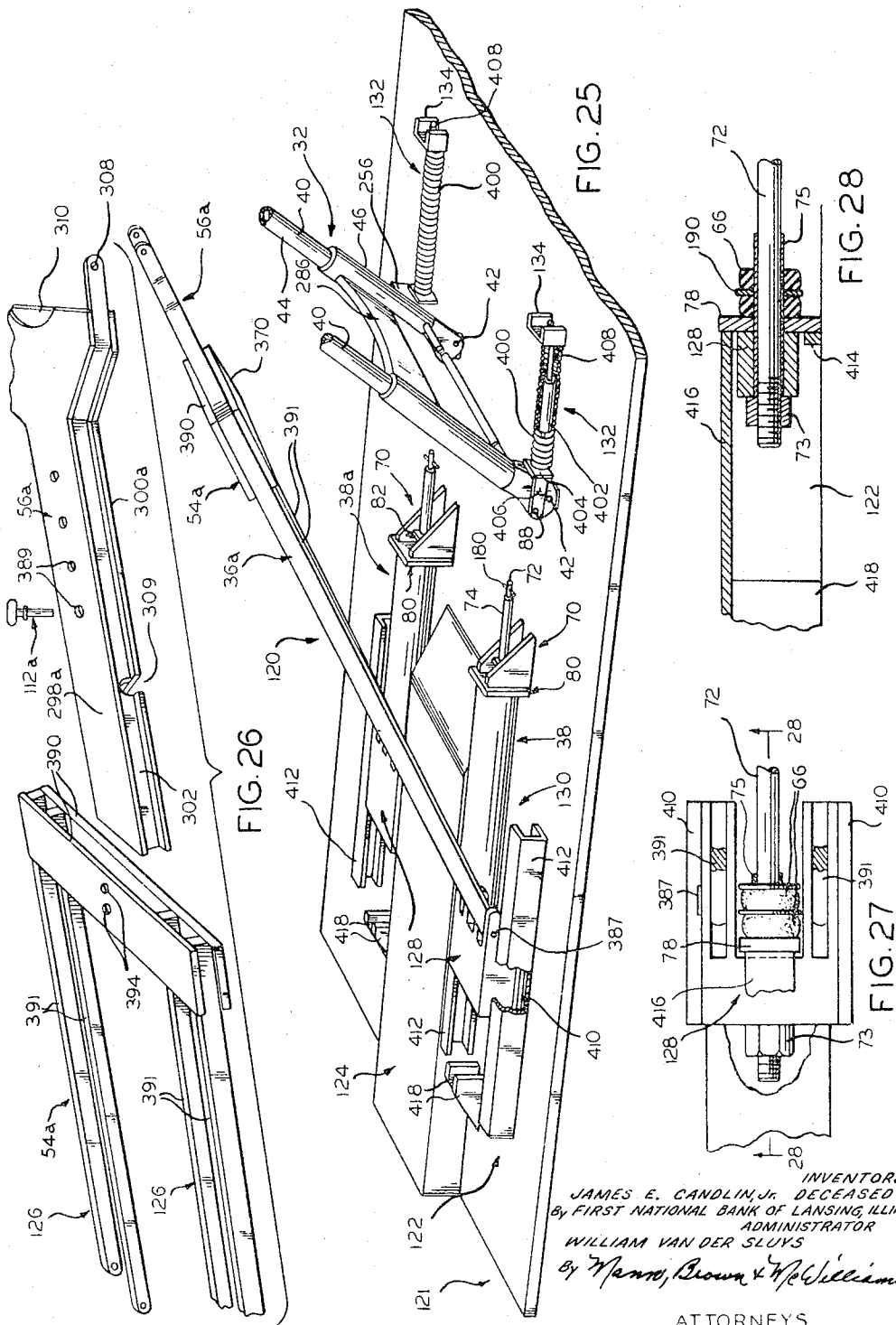
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9 Sheets-Sheet 9



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3,289,987

FIFTH WHEEL STAND FOR RAILROAD CARS

James E. Candlin, Jr., deceased, late of Lansing, Ill., by First National Bank of Lansing, Lansing, Ill., administrator, and William Van Der Sluys, Homewood, Ill., assignors to Pullman Incorporated, Chicago, Ill., a corporation of Delaware

Original applications May 4, 1960, Ser. No. 26,884, now Patent No. 3,183,854, dated May 18, 1965, and Oct. 8, 1963, Ser. No. 317,864. Divided and this application Nov. 3, 1965, Ser. No. 506,451

The portion of the term of the patent subsequent to May 18, 1982, has been disclaimed

11 Claims. (Cl. 248—119)

This application is a division of our application Serial No. 26,884, filed May 4, 1960, now Patent No. 3,183,854, granted May 18, 1965, and our application Serial No. 317,864, filed October 8, 1963.

This invention relates to a fifth wheel stand for railroad cars, and more particularly, to a device for use in the piggyback system of freight handling, for the purpose of latching the trailer to the car.

As is well known in the art, the piggyback system of freight handling contemplates the transportation of freight in trailers which are carried on a railroad flatcar a major portion of the distance between shipping points and destinations. The trailers may be positioned on the car by any one of a number of standard methods involving either the use of the trailer tractor or other prime mover, or a crane for bodily lifting the trailer onto the car.

Trailers are customarily secured to the car by what is known as a fifth wheel stand, which uniformly includes a latching device for grasping the kingpin of the trailer, with the stands being supplemented in most instances by suitable tie down devices associated with the trailer chassis.

One of the foremost difficulties in this art is the very practical problem of having to spot the trailer with respect to the fifth wheel stand so that the kingpin latch device of the stand may be actuated to serve its intended function. Trailers customarily include a load that may be on the order of 60,000 pounds, which makes it very difficult to shift the trailer after it has been positioned on the car and left standing on its landing gear. This means that the trailer must either be very carefully spotted or that the fifth wheel stand must be arranged to permit a reasonable tolerance in the trailer positioning.

Most conventional forms of fifth wheel stands involve a support or structure for the kingpin latching device which is operable to move the latching device from an inoperative retracted or lowered position on the floor of the car to an operative elevated position in which the latch device engages the trailer kingpin, and of course, trailers must be spotted on the car so that the trailer kingpin is within the operative range of the latch device. Heretofore, improvements in this art have been directed toward increasing the spotting tolerance permitted by the stand and relying on the stand, at least to some extent, to effect such lateral and longitudinally contrary of the kingpin as may be required.

Furthermore, the usual approach to the problem has been that the fifth wheel stand should have a fixed path of movement between its inoperative and operative positions, leaving it is those who load the trailer on the car to do so accurately enough that the kingpin and the trailer will be properly engaged and centered, if need be, by elevating the fifth wheel stand. Moreover, the opera-

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tive elevated position of conventional stands—customarily is at a fixed distance above the car deck, which does not take into consideration that trailer heights vary considerably; while some stands permit some variation in trailer height, the spotting tolerance of the stand is adversely affected.

We have determined that as a matter of practice, the actual spotting tolerance employed can be relatively small as tractor operators have no great difficulty in spotting trailers within an inch or two or any desired location. Therefore, in contrast to previous approaches, our invention involves arranging the stand so that it may be adjusted as required to obtain the desired seating action with respect to the trailer kingpin without having to bodily move the trailer.

Consequently, a principal object of this invention is to provide a fifth wheel stand for railroad cars that not only permits adjustment of the position of the kingpin latching device to accommodate a reasonable trailer spotting tolerance, but also provides optional fifth wheel height and contemplates that spotting tolerance will be independent of the height of the trailer.

Another difficulty with conventional fifth wheel stands is the mandatory use of some sort of power operated jack to raise and lower them, due to ineffective mechanical advantage arrangements and slow acting leverage systems, and this requirement heretofore has been satisfied by providing an electrically powered actuating unit that necessarily must be connected to an appropriate source of energy. These devices thus means that railroad yards adapted for handling the piggyback system must have a fairly extensive wiring installation that will provide electrical power on the order of 120 volts.

Of course, cars having such stands can only be loaded and unloaded at yards having such systems, which precludes piggyback shipment to and from intermediate points not having the required facilities.

A further object of this invention is to provide a fifth wheel stand that may be actuated with facility either manually or by a single suitable powered device, so that in the event loading and unloading of piggyback shipments at points other than the main piggyback yard is contemplated, a manually operable form of the invention may be employed to handle such shipments.

Other objects of the invention are to provide an improved cushioning arrangement for fifth wheel stands, to provide an improved fifth wheel plate structure and kingpin latching device for fifth wheel stands, to provide a fifth wheel stand adapted for use on low level flatcars having raised draft gear sills, to provide a new system of securing trailers on flatcars in piggyback fashion, and to provide a fifth wheel stand that is inexpensive of manufacture, convenient in use even by inexperienced personnel, and adapted for use in connection with all standard railroad car and trailer equipment customarily employed in piggyback service.

Other objects, uses and advantages will be obvious or become apparent from a consideration of the following detailed description and the application drawings.

In the drawings:

FIGURE 1 is a diagrammatic perspective view illustrating one embodiment of our invention as it would be applied to a conventional railroad flatcar, illustrating the same in its operative position in which it is adapted for connection to the kingpin of a conventional trailer that is to be mounted for transit on the railroad car;

FIGURE 2 is similar to FIGURE 1, but illustrating the fifth wheel stand in its lowered inoperative position when it is latched against the floor of the car;

FIGURE 3 is a fragmental diagrammatic perspective view of a latch device that is employed to hold the fifth

wheel stand of FIGURES 1 and 2 in its lowered inoperative position;

FIGURES 4-8 are diagrammatic side elevational views of the apparatus shown in FIGURES 1 and 2, illustrating the operation of same in securing a trailer to a railroad flatcar;

FIGURE 9 is a diagrammatic perspective view on an enlarged scale of a specific form of base plate structure that may be employed with the specific embodiments of the fifth wheel stand of FIGURES 1 and 2, parts being shown in section and broken away to facilitate illustration;

FIGURE 10 is a diagrammatic sectional view approximately along line 10-10 of FIGURE 9;

FIGURE 11 is a diagrammatic fragmental sectional view approximately along line 11-11 of FIGURE 9;

FIGURE 12 is a diagrammatic fragmental sectional view approximately along line 12-12 of FIGURE 9;

FIGURE 13 is a side elevational view of a specific form of the type of fifth wheel stand shown in FIGURES 1 and 2, with the lowered inoperative position and the position of maximum elevation being indicated in broken lines;

FIGURE 13a is a diagram illustrating the relation between the pivotal connection of the vertical and diagonal struts of the stand with respect to the trailer kingpin when the kingpin has been latched to the stand;

FIGURE 14 is a diagrammatic sectional view on an enlarged scale approximately along line 14-14 of FIGURE 13;

FIGURES 15 and 16 are diagrammatic fragmental sectional views illustrating the operation of the spring device employed for biasing the vertical strut to a partially elevated position;

FIGURE 17 is a diagrammatic exploded perspective view of the diagonal strut arrangement employed in the embodiment of FIGURES 1-16;

FIGURE 18 is a fragmental sectional view on an enlarged scale through the locking end of the latch pin shown in FIGURE 17;

FIGURE 19 is an elevational view of the vertical strut arrangement employed in the embodiment of FIGURES 1-18, taken from the right hand side of FIGURE 13 and showing same applied to the fifth wheel plate structure, parts being broken away to facilitate illustration;

FIGURE 19a is a fragmental perspective view showing the jack actuating gear box of FIGURE 19 as adapted to receive a conventional power operated wrench, together with a latching arrangement therefor for holding the vertical struts against retraction during rail transit;

FIGURE 20 is a fragmental sectional view approximately along line 20-20 of FIGURE 19, parts being shown in elevation;

FIGURE 21 is a diagrammatic fragmental sectional view approximately along line 21-21 of FIGURE 20, parts being shown in elevation;

FIGURE 22 is a plan view of the kingpin latching jaws employed in the fifth wheel stand of this invention;

FIGURE 23 is a sectional view along line 23-23 of FIGURE 22;

FIGURE 24 is an elevational view along line 24-24 of FIGURE 20;

FIGURE 25 is a diagrammatic perspective view similar to FIGURES 1 and 2 illustrating an embodiment of the invention adapted for application to low level flatcars having raised draft sills, with the fifth wheel plate structure omitted and the stand struts shown in partially raised position;

FIGURE 26 is a diagrammatic exploded perspective view of the diagonal strut structure employed in the embodiment of FIGURE 25;

FIGURE 27 is a fragmental plan view of one of the sliding diagonal strut pivot members and associated structures, parts being broken away; and

FIGURE 28 is a fragmental sectional view along line 28-28 of FIGURE 27.

GENERAL DESCRIPTION

Reference numeral 10 of FIGURES 1 and 2 generally indicates one embodiment of our invention secured to the supporting surface or bed 12 of a standard railroad flatcar 14 (which may take any suitable form, and which is illustrated only diagrammatically), the stand 10 being applied to what may be termed the front end 15 of the car. As is well known in the art, the purpose of fifth wheel stands, such as stand 10, is to secure the front end of a trailer to the car by connection to the trailer kingpin, and for purposes of this description the car end shown may be considered the front end, though it is obvious that the stand of this invention may be applied to any point on the car desired.

Referring to FIGURE 4, one conventional form of trailer is generally indicated at 16 and it may be assumed that trailer 16 represents any type of trailer arrangement that may be employed in piggyback service. Such trailers 16 are normally provided with suitable wheels (not shown) attached in a conventional manner to the trailer chassis (usually adjacent the rear end of the chassis), which for purposes of this invention may or may not be separably connected to the trailer body designated 17. The trailer 16 customarily includes also landing gear 22 and the afore-referred to king pin 24.

Customarily, the trailer 16 is transported on highways by a tractor to which the trailer is secured by an appropriate fifth wheel mechanism that grasps the kingpin 24. In accordance with standard piggyback practices, the trailer 16 is applied to the railroad car 14 by being backed onto the same, or otherwise positioned on the car to the position indicated by FIGURE 4, whereupon its front end is lowered onto the landing gear 22 and the tractor is disconnected and removed (where it is employed to position the trailer on the car). Then, the particular fifth wheel stand employed is actuated to gather and grasp the kingpin 24 and lift the front end of the trailer off of its landing gear 22 for purposes of securing the trailer on the car for railroad transit.

The stand 10 forming the present invention generally comprises a fifth wheel plate structure 30 (see FIGURE 1) carried by a lift structure 32 composed of a vertical supporting strut structure 34 and a diagonal prop strut structure 36, and cushioning devices 38 (shown in block diagram form in FIGURES 1 and 2) that are coupled to the lower end of the diagonal strut structure 36.

The vertical strut structure 34 comprises a pair of spaced vertical struts 40 pivoted by pins 42 to the bed of car 12 and composed of telescoping members 44 and 46, which in accordance with the present invention are moved between extended and retracted positions by jack devices 48, indicated generally in FIGURE 19, that are operated through suitable gearing 49 selectively providing relatively high and relatively low gear ratios for high and low speed lifting and lowering of fifth wheel plate structure. The vertical struts are pivotally secured to the fifth wheel plate structure by trunnion forming pins or stub shafts 50.

The diagonal strut structure 36 consists of a telescoping diagonal strut 52 (see FIGURE 17) composed of telescoping members 54 and 56; member 56 is pivoted to fifth wheel plate structure 30 by appropriate trunnion forming pins 58 while member 54 is pivoted to a slider member 60, by appropriate pins 62, which latter member 60 is mounted in trackway 64 for movement toward and away from the vertical struts 40.

Referring to FIGURES 9-11, it will be observed that the slider member 60 is keyed to the respective cushioning devices 38, which each comprise a plurality of resilient pads 66 interposed between stop members 68 and 70 and having extending therethrough a rod or shaft 72 over like ends of which the opposite ends of the slider member 60

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are received and held in position by appropriate nuts 73 (see FIGURE 10). In the specific embodiment shown in FIGURES 9-11, pads 66 of each cushion device are mounted on a tubular member 75 to facilitate assembly and improve their shock absorbing action, as hereinafter made clear.

As indicated in FIGURES 9 and 11, the other ends of rods 72 have nuts 76 threaded thereon that bear against the adjacent ends of tubular members 75. In the form illustrated, the pads 66 are pre-stressed to press followers 78 and 80 against the respective stop members 68 and 70, and rods 72 extend through appropriate guide plates 82 forming a part of the respective stop members 70. Sleeves 74 are carried by rods 72 to protect their screw threading.

Referring to FIGURES 1, 2 and 13, it will be seen that tension spring devices 86 are connected between pins 88 affixed to the vertical struts 40 eccentrically of pins 42 and abutment plates 90 affixed to the bed of the car. In accordance with this invention, the spring devices 86 are arranged so that they will pull the fifth wheel stand from its lowermost horizontal inoperative position to a partially raised inclined position from which it may be manually brought to a substantially vertical position by the exercise of minimum effort. The fifth wheel stand is held in its lowered position by the latch arrangement generally indicated at 92 in FIGURES 2 and 3.

The fifth wheel stand 30 is provided with a kingpin latching device 94 (see FIGURES 20-24) including jaws 96 mounted under the kingpin receiving opening 104 of the fifth wheel plate structures for movement toward and away from each other by ratchet assembly 98 (see FIGURES 20-23). Jaws 96 are formed as at 100 (see FIGURE 23) to define the kingpin seat of the stand.

After the trailer has been spotted on the flatcar within the tolerance permitted by stand 10 and the trailer tractor removed if it is employed, the operator operates latch 92 to release the stand from the car, and the spring devices 86 acting on the eccentrically positioned pins 88 of the vertical struts 40 draw the stand to approximately the position indicated by FIGURE 5, it being understood that the members 54 and 56 of the diagonal strut 52 are allowed to slide with respect to each other until otherwise indicated. The operator then grasps the stand in a convenient manner, as by employing handle 101 provided for this purpose, and manually swings it to approximately the upright position indicated by FIGURE 6, where it will stand by itself due to the action of the tensioning devices, after which jaws 96 are fully opened, if not already so positioned. The operator then actuates the jack devices 48 at high gear by employing a suitable hand operated ratchet mechanism (such as that indicated at 196 in FIGURE 19) or an appropriate power wrench to move the vertical strut members 44 out of the vertical strut members 46 for the purpose of further elevating the fifth wheel plate structure 30 until it contacts the undersurface 110 of the trailer (see FIGURE 7), handle 103 being employed to move the fifth wheel plate structure as may be required so that the trailer kingpin enters kingpin receiving opening 104. The jack devices 48 of each vertical strut are coupled together by shaft 108 so that members 44 rise simultaneously.

The operator then shifts the gearing 49 to low gear and raises the trailer until the nearest holes 114 and 116 of the diagonal strut members 54 and 56, respectively, are aligned, after which latch pin 112 (see FIGURE 17) is inserted through these aligned holes. After pin 112 is in place, the jack devices 48 are further sufficiently actuated to lift the trailer off its landing gear to approximately the position indicated by FIGURE 8. If the trailer brakes are applied, application of latch pin 112 may be effected after the landing gear has been lifted free of the car deck.

When the trailer has been raised as high as required, the jacks 48 are preferably latched against retraction

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movement as by employing one of the latching arrangements hereinafter referred to.

The kingpin latching device 94 is then actuated to close kingpin jaws 96 against the kingpin, after which ratchet assembly 98 is latched in the broken line position of FIGURE 20 and its mechanism rendered inoperative by the lug 117 shown in FIGURE 20.

If any tie down devices are to be employed, these then may be applied to the trailer.

During transit, buff and draft forces applied to the car 14 are cushioned by the cushioning devices 38.

When the end 15 of car 14 is subjected to an impact in draft, car 14 tends to move to the right of FIGURE 8 with respect to trailer 16. This makes the vertical struts 40 tend to swing counterclockwise about their pins 42 (in the showing of FIGURE 8) with respect to the car and draws the slider member 60 against followers 78 (see FIGURE 9) which are in turn pressed against pads 66 that absorb the impetus of the shock as they are compressed. When the shock has been dissipated, the pads resiliently return followers 78 against stops 68 and at the same time restore vertical struts 40 and trailer 16 to their normal positioning with respect to the car.

When an impact in buff is applied to end 15 of car 14, car 14 will tend to move to the left of FIGURE 8 with respect to trailer 16 and vertical struts 40 will tend to swing clockwise about their pins 42 (in the showing of FIGURE 8). This presses slider member 60 against nuts 73, which has the effect of drawing nuts 76 of the respective shafts 72 against followers 80 and pads 66 to cushion the impact. After the impetus of the buff impact has been dissipated, the resilience of pads 66 restores the followers 80 against stop members 70 and this action of followers 80 against nuts 76 effects restoration of the vertical struts 40 and trailer 16 to their normal positioning with respect to the car 14.

Of course, buff and draft impacts against the other end of the car are handled in a similar manner but in reverse.

The trailer is released from the stand by operating kingpin latching device 94 to fully open jaws 96, after which the ratchet device 98 is again latched in its position of FIGURE 20. The jack devices 48 are then operated at low gear to retract the vertical struts until the trailer landing gear wheels support the trailer weight and a slight clearance of from $\frac{1}{2}$ to $\frac{3}{4}$ inch appears between the fifth wheel plate structure and the undersurface of the trailer. Upon reversing the operation of the jack devices 48 and raising the fifth wheel plate structure into light contact with the trailer, the latch pin 112 of the diagonal strut should be loose enough to be withdrawn manually if it cannot be withdrawn as the plate structure is raising. After the pin 112 is removed, the gearing 49 is shifted to high gear and jack devices 48 lowered all the way, after which the stand is pushed rearwardly of the car (to the right of FIGURE 1) so that it will swing downwardly into engagement with latch device 92.

The trailer may now be removed by employing any standard procedure for doing so.

The embodiment 120 of FIGURES 25-28 is especially adapted for use on cars 121 having a low level bed 122, which are necessarily provided with raised draft sill structure 124 because of the standard height requirements for draft gear.

In this embodiment of the invention, the fifth wheel plate structure 30 (not shown) and vertical strut structure 32 are the same as before described. The diagonal strut structure 36a includes member 56a which is essentially the same as member 56 and composite member 54a that telescopingly receives member 56a. The composite member 54a is provided with spaced linkage structures 126 which are pivoted to spaced slider members 128 mounted in ways 130 fixed to bed 122 on either side of draft gear sill 124. Slider members 128 are associated

with cushioned devices 38a that are essentially the same as cushioned devices 38.

In this embodiment of the invention, the bias applied to the vertical struts 40 for purposes of initially partially raising the stand is affected by compression spring devices 132 that are interposed between the respective vertical strut pins 88 and an appropriate abutment structure 134.

The stand 120 is attached to the trailer kingpin in substantially the same manner as previously described and operates in the same manner as previously described to cushion the impetus of buff and draft impacts.

SPECIFIC DESCRIPTION

Referring now to the specific form of the invention illustrated in FIGURES 9-24, the vertical and diagonal strut pivots are associated with a base plate structure 140 including longitudinally extending plates 142 affixed to the car bed as by welding and joined by brace plates 144 and 145. The ways 64 may be defined by continuous track forming members 146, joined as by brace plates 147 and welded to the bed of the car to extend parallel to its longitudinal center. A stop plate 149 may be affixed at the front end of track forming members 145, if so desired. The slider member 60 is formed with a foot or base 148 which slidably engages within the track forming members 146 (see FIGURE 9). Slider member 60 is provided with lugs 150 to which the diagonal strut member 54 is attached by pins 62 received in appropriate holes 63, and as indicated in FIGURE 10, the slider member 60 at its ends 152 is perforated as at 154 to receive the ends 156 of shafts 72 and the respective tubular members 75. Of course, the shaft ends 156 are threaded for application of nuts 73.

The stop members 68 each comprise an upright plate 170 welded to the respective plate members 142 and reinforced by webs 172 welded to the car bed.

Preferably, a top plate 176 is affixed (as by welding) to the top of the respective plates 170 with its face 171 in vertical alignment with face 173 of the respective plates 170, for contact by followers 78 and for purposes of affixing one end of an appropriate housing 175 (see FIGURE 13) for cushion devices 38, the other end of which may be affixed to the tops of stop members 70. Stop members 68 also include a bottom plate 177 welded to the top of the respective base plate members 142 and having a face 171 in vertical alignment with face 173 of the respective plates 170.

Stop members 70 each comprise spaced plates 180 welded to the respective plate members 142 and having fixed between same plate 182 which is formed with perforation 184 through which the respective sleeves 74 and rods 72 extend.

The rods or shafts 72 at their ends 181 each receive a latch pin 186 for securing the sleeve 74 between nut 76 and said end 181 of the rod or shaft 72.

The pads 66 of the cushioning device may be of any suitable type, those illustrated being intended to represent the well-known type in which the pads are spaced by metallic separator plates 190. Followers 78 and 80 may be of any suitable type, but in the form illustrated comprise quadrilateral metallic plates 192.

In assembling the respective cushioning devices 38, pads 66 and separator plates 190 may be first applied to the respective tubular members 75 together with followers 78 and 80 after which the followers are pressed against the pads by a suitable clamp device to pre-stress them and compress the whole so that the pads and followers may be applied between stop members 68 and 70 in the positions shown. The respective rods 72 are then inserted within the respective tubular members 75 and through ends 152 of slider member 60, after which nuts 73 and 76 are applied to the rods 72 and turned up against the ends of the respective tubular members. Sleeves 74 and guide plates 82 are then slipped over ends

181 of rods 72, plates 82 welded in place, and pins 186 applied, all in any convenient order.

The external surface of the respective tubes 75 is preferably cadmium plated and proportioned to slidably engage the pads during the assembly process so that when they are compressed they frictionally engage the respective tubular members 75. This arrangement permits the provision of uniform frictional characteristics between the individual pads and the tubular member, and increases the shock absorption characteristics of cushion devices 38.

The vertical strut pins 42 are received through appropriate holes 193 formed in lugs 194, which are affixed to the car bed and the respective base plate members 142 in the manner generally indicated in FIGURE 9.

The tension spring devices 86 each comprise a coiled tension spring 200 having conical end portions 202 through which extend rod members 204 and 206. The rod member 204 is loosely received in opening 208 formed in plate 210 that forms abutment 90 and is affixed to the bed of the car and to an extension 212 of the adjacent base plate member 142, as by welding. Abutment plate 210 may be reinforced by an appropriate strengthening web 216. As indicated in FIGURE 12, rod 204 has threaded thereon an appropriate nut 218, and it may be mentioned that perforation 208 of plate 210 should be sufficiently wide to permit rod 204 to move as required as the fifth wheel stand is moved between the positions of FIGURES 1 and 2.

Rod 206 is formed with an eye end portion 220 that is received over pin 88 of the respective vertical struts.

Both rods 204 and 206 are formed with conically shaped ends 222 and 224, respectively, that prevent these members from being pulled from the spring 200.

As already indicated, these spring devices 86 are arranged so that they will pull the vertical strut structure 32 most of the way to its upright position. While springs 200 will be under minimum tension when the stand is in its elevated position it is contemplated that sufficient bias will still be applied to pins 88 to stabilize the stand in this position. When the stand is lowered to the position of FIGURE 2, the movement of the vertical struts clockwise of FIGURE 13 draws the rods 206 away from rods 204 to store in springs 200 the energy required to swing the stand to its upright position.

The relationship should be such that when the stand is in its fully retracted position, the springs 200 will be tensioned sufficiently to raise the stand at least to about a 75 degree angulation when released from the restraining action of latch 92, and when the stand is released, the diagonal strut members disconnected, and the vertical strut pushed toward the car bed, the fifth wheel plate structure will settle against the car bed without impact. The fully tensioned positioning of the spring device elements is approximately indicated in FIGURE 16 while the approximate positioning of the tension spring device elements after it has lifted the stand to the position desired is indicated in FIGURE 15.

Nuts 218 may be turned to provide the tensioning desired and abutments 90 serve as safety stops against which the ends of springs 200 are drawn when the springs have been tensioned to a predetermined maximum safe limit.

The latch device 92 (see FIGURE 3) may comprise a catch 230 pivoted between ears 231 of bracket 232 and provided with a projection 233 adapted for engagement by an operator's foot to press catch 230 clockwise of FIGURE 3 against the action of compression spring 234 to release catch hook portion 235 from engagement with the ledge 236 forming a part of angle member 237 that is affixed to the fifth wheel plate structure on the same side as the ratchet mechanism 106 (or whatever power actuator may be employed). The catch hook portion 235 is formed with a cam surface 238 that is engaged by ledge 236 when the stand is lowered to its position of

FIGURE 2, to position the catch for reception over ledge 236, suitable pin 239 effecting the necessary pivotal action.

The vertical struts 40 include upper clevis' 250 through which the pins or stub shafts 50 that pivot them to the fifth wheel plate structure are received; clevis' 250 may be in the form of tubing 249 extending through and welded to the strut members 44 as at 251. Vertical strut members 46 are tubular and have formed at their lower ends pierced lugs 252 through which pins 42 extend. Of course, pins 42 when applied to lugs 194 and 252 are provided with suitable means for preventing their dislodgement such as discs 254 welded to the respective pins after they have been inserted in the positions shown. One of the tubular members 46 carries a gear box 256 (see FIGURE 19) journalling the shaft 257 to which the actuating devices such as ratchet device 106 are keyed, which shaft 257 is slidably mounted within box 256 and has keyed thereto selection gears 258 and 260, which are adapted to respectively mesh with gears 262 and 264, respectively. Latch pin 266 of the gear box 256 is selectively engageable in either of shaft recesses 268 or 270 for purposes of providing the gearing relation desired and it may be mentioned that preferably gears 258 and 262 when in meshing engagement provide a rapid lifting action on the vertical struts, while gears 260 and 264 when in meshing engagement provide a slower, high torque lifting action. The relative speeds employed are optional, but it is preferred that the high speed lifting action of the vertical struts be about five times that of the low speed lifting action.

Ratchet device 106 in the form of FIGURE 19 is permanently keyed to shaft 257, as by a suitable pin 271, and thus forms a locking arrangement that precludes accidental retraction of the stand vertical struts during rail transit since ratchet device 106 will not swing 360 degrees about the axis of shaft 257 because of the length of its handle 273.

The gears 262 and 264 are keyed to shaft 108 which extends between and is journaled in both of the vertical strut members 46, and is likewise keyed to bevel gears 272 that mesh with bevel gears 274 keyed to worm shaft 276 journaled in appropriate bearings 278 appropriately mounted within the respective vertical strut members 46. The worm shafts 276 are formed with appropriate worm threads 280 that are threadedly engaged in nuts 282 affixed in any suitable manner within the lower ends of vertical strut members. The upper ends 284 of the vertical strut members 46 may be formed in any suitable manner to provide an appropriate guiding action on the exterior surfaces of vertical strut members 44.

Preferably, the vertical strut members 46 are joined by strengthening web 286, which is indented as at 285 to permit operation of the kingpin latching device ratchet assembly 98.

Extension and retraction of the vertical struts may also be effected by employing the arrangement suggested by FIGURE 19a, wherein end 287 of shaft 257 is squared as at 289 to receive a conventional form of power wrench (not shown). In this alternate arrangement shaft 257 is latched against turning movement by pawl 291 pivotally carried on shaft 293 that is affixed in any suitable manner to the adjacent strut 40. Pawl 291 is positioned between discs 295 that are welded to shaft 293 and is formed with internal shoulder 297 against which a corner of shaft 289 seats when the pawl 291 is in its locking position. The pawl 291 is swung away from shaft 257 to permit application of the power wrench to gearing 49.

The diagonal strut 52 (see FIGURE 17) includes the aforementioned member 54, which in the form illustrated, comprises a bar 290 having the holes 116 formed therethrough in an appropriate spacing and having fixed to its lower end the clevis plates 292 through which the pins 62 extend. Plates 292 may be reinforced by guide

plate 294 and strengthening web 296, all welded together and to bar 290 to form a rigid unitary structure.

The diagonal strut member 56 comprises a top plate 298 and a bottom plate 300 welded to spaced web plates 302 which are formed with the spaced holes 114 that are to be aligned with one of the holes 116 of diagonal strut member 54. The web plates 302 are formed at at 304 to define clevis portions 306 that are perforated as at 308 to receive the respective pins 58. Plates 302 and bottom plate 300 are formed to define notch 309, which is positioned and proportioned to receive shaft 108 of the vertical struts so that the stand will lie at the lowest possible level in its lowered inoperative position (see FIGURE 13).

Tie plate 310 may be welded between clevis portions 306 for reinforcing purposes.

The locking pin 112 is preferably proportioned to extend through web plates 302 as well as bar 290 and is provided with a locking ball 312 that is biased against peened over annular lip 314 by compression spring 316 acting between the ball and the screw threaded plug 318 (see FIGURE 18). Ball 314 prevents the pin 112 from being dislodged during service, but is readily retractable on withdrawal of pin 112 to permit the diagonal strut members to be disconnected from one another.

Pin 112 may be provided with a suitable handle 320 to which a chain may be attached for affixing the pin to a convenient portion of diagonal strut member 56.

The fifth wheel plate structure 30 comprises plate member 330 having affixed thereto spaced vertical plates 332, 334, and 336. The pins 50 that secure the vertical struts 40 to the fifth wheel plate structure are secured between flanges 332 and 334 in any convenient manner while pins 58 that are employed to secure the diagonal strut to the fifth wheel plate structure are applied between flanges 334 and 336 in any suitable manner.

Referring to FIGURES 13 and 13a, it will be noted that the pins 50 and 58 are not axially aligned, but are spaced somewhat from each other longitudinally of the car. In accordance with this invention, the axes of pins 50 and 58 are spaced sufficiently so that, when the stand is approximately in the position of FIGURE 13, they are coincident with planes extending transversely of the car and along the central axes of the respective vertical and diagonal struts and joining at point 340 above these pins, which point is approximately in alignment with the vertical axis of the trailer kingpin (and its corresponding seat in the fifth wheel plate structure), when it is received in and latched to the fifth wheel plate structure, and located as close to the trailer undersurface 110 as practical (for instance, the relative location suggested by FIGURE 13a). This should position point 340 near the trailer undersurface but at the center of the minimum bearing area 341 of the trailer kingpin that is required to prevent deformation of the pin.

The reason for having this relationship of the trailer kingpin and the vertical and diagonal strut pivotal axes is that undue tensioning of the trailer kingpin is avoided when, for instance, buff and draft impacts are applied to the car on which the trailer 16 is mounted. Conventionally, the pivotal connections of diagonal and vertical struts to the kingpin latching device are axially aligned, and said axes are positioned on the order of two inches or more below the kingpin bearing area 341, and we have determined that the positioning of the trailer kingpin above the vertical and diagonal strut pivots creates a moment when the railroad car is subjected to longitudinal impacts, which cause a cocking movement of the fifth wheel plate structure with respect to the trailer that necessarily applies a downward thrust on the kingpin through the stand latching device. The result is the application of considerable tension to the kingpin as a result of coupler impacts through a leverage arrangement that approaches that employed in using conventional bottle cap openers to remove bottle caps. In some in-

stances involving conventional arrangements, the kingpin has been drawn from the trailer body.

The arrangement indicated in FIGURES 13 and 13a insures that the forces acting on the kingpin during impacts are applied to the kingpin as closely as possible to its juncture with the trailer body, for instance, where indicated by point 340, and thus at the theoretical end of the truss arrangement defined by the vertical and diagonal struts. This eliminates the objectionable above mentioned leverage factor, since thrusts are applied to kingpin portion 341, which is that portion of the kingpin designed to take shear forces that act parallel to undersurface 110. Thus, in accordance with our invention, even during coupler impacts, the trailer kingpin will be subjected only to forces that it is designed to withstand, namely forces acting in shear.

Referring to FIGURES 20-24, the plate member 330 of the fifth wheel plate structure is formed to define intermediate of the forward and rearward ends thereof the kingpin opening 104, which in accordance with this invention is a closed perimeter opening extending laterally of plate member 330 so that the fifth wheel plate structure resists thrusts in either direction with equal facility. Opening 104 is elongate in configuration (compare FIGURES 20 and 21) and extends laterally of plate member 330 and transversely of the car 14 fixed underneath opening 104 are guide elements 342 carrying track members 344 extending laterally of the plate member 330 on which the kingpin latch device jaws 96 are slidably mounted for movement laterally of the plate member and transversely of the car 14. Jaws 96 are each provided with pierced lugs 346 and 347 through which extends shaft 348, the ends 350 and 352 of which are formed with right and left hand threads, respectively, on which are threaded nuts 354 that are received between the respective lugs 346 and 347. Appropriate springs 356 bias the nuts against shaft 348 sufficiently to insure their movement only on operation of ratchet assembly 98.

Operatively associated with shaft 348 in a conventional manner is ratchet device 358 of any conventional type, which together with shaft 348 forms ratchet assembly 98. The jaws 96 each have secured thereto guide pins 360 which ride in perforations 362 of plates 334 and 336 to guide the movement of the respective kingpin latching jaws.

The fifth wheel plate structure may be reinforced by appropriate stiffener bars 364 (see FIGURE 19) and 368, as well as angle member 366 applied between plates 336. Associated with the rearward stiffener 368 is a lock device 370 for holding ratchet assembly 98 in the inoperative broken line position of FIGURE 20. Device 370 comprises a depending plate 372 affixed to the end of the indicated stiffener 368 and plate 372 has pivotally secured thereto as by bolts 373 a hooked shaped latching arm 374 and an eccentrically pivoted pawl 376. When pawl 376 is in the position of FIGURE 24, arm 374 cannot be swung from its indicated position and thus will provide support for ratchet device 358. When pawl 376 is swung in either direction away from its position of FIGURE 24, pawl 374 may be pivoted to release or receive ratchet device 358.

Lug 117 for locking the operating mechanism of ratchet device 358 in the position of FIGURE 20 is affixed to angle member 366 in the plane of movement of ratchet device 358 and is provided with a cam surface 377 adapted to engage the ratchet pawl 379 and pivot the latter into engagement with the teeth 381 of the conventional ratchet wheel 383 that forms a part of ratchet device 358. The arrangement is such that ratchet pawl 379 when engaged by lug 117 holds shaft 348 against rotation in the direction that would open jaws 96.

When the ratchet assembly 98 is actuated, after the

fifth wheel stand has been placed in the position of FIGURE 8, the jaws 96 are drawn together about the kingpin and the seat portions 100 (formed to complement the shape of standard kingpins 24) thereof effectively lock the kingpin within the fifth wheel plate structure. It will be noted that jaws 96 each include a projection 385 that are received within king slot 387 (see FIGURE 13a) when the jaws are locking engagement with the kingpin.

In the form illustrated, forward and rearward spacers or abutment members 380 are affixed to the undersurface of plate member 330 adjacent the middle portion of opening 104 on either side of the opening which limit the permissible movement of the jaws towards each other, as seat portions 100 are struck on radii complementary to the corresponding radii of the standard kingpin. These spacers are indicated in FIGURES 20-22 and their principal purposes are to take the thrusts applied to the fifth wheel plate structures through the kingpin (or vice versa) and to guide the kingpin in its movement out of kingpin opening 104. The spacers 380 thus prevent the kingpin groove portion from catching on the plate 330 when the stand is to be released from the trailer (note the kingpin centering action of these elements indicated in FIGURES 20 and 22). Spacers 380 are preferably hardened to avoid broaching, when the kingpin leaves kingpin opening 104, in the event the stand is lowered from the trailer without removing diagonal strut pin 112.

The truss point 340 described in connection with FIGURE 13a is applied to FIGURE 23 to indicate its desired positioning with regard to jaws 96.

Referring now to the embodiment of FIGURE 25, the modified diagonal structure includes the diagonal strut member 56a which is similar to member 56 (except the pin receiving holes 389 are formed in the top and bottom plates 298a and 300a), and member 54a which is composed of spaced plates 390 affixed at their ends to spaced bars 391 which are respectively pivoted to the slider members 128 by pins 387. Diagonal strut member plates 390 are formed with appropriate holes 394 for alignment with one of the holes 389 to receive a pin 112a similar to pin 112.

The compression spring devices 132 each comprise a compression spring 400 received over tube 402 and acting between flange 404 of the tube and abutment structure 134, the latter being fixed to the bed of the car. Tube 402 includes lug 406 that is secured to the respective vertical strut pins 88. It will be noted that the compression spring devices extend rearwardly of the vertical struts 40, rather than forwardly as in the case of tension spring devices 38; however, the biasing effect on the vertical struts is the same. In the arrangement of FIGURES 25-28, the tubes 402 have affixed within same a headed pin 408 which extends through the respective abutments 134 for guiding purposes.

Alternately, tensioning devices similar or equivalent to cushioning devices 86 may be substituted for compression devices 132, as will be obvious to those skilled in the art.

The slider members 128 are formed with oppositely directed flanges 410 for cooperation with the track members 412 defining ways 130, said track members 412 being fixed to car bed 122 as by welding. The rods 72 of cushioning devices 38a extend through slider members 128 and carry nuts 73 which are positioned to hold the slider members against the respective follower plates 78 (see FIGURE 27). Follower plates 78 are biased against stop abutment 414 (fixed to bed 122) and top plate 416 fixed to lugs 418 that may be welded to bed 122 (see FIGURE 28).

The remainder of the components of the embodiment of FIGURE 25 are essentially the same as the corresponding elements of the embodiments of FIGURES 1-24 already described as indicated by like reference numerals.

DISTINGUISHING CHARACTERISTICS OF THE INVENTION

It will therefore be seen that we have provided a fifth wheel stand for railroad cars having a number of important characteristics.

For instance, an important feature of this invention is the elimination of the need for moving the trailer longitudinally of the railroad car to center the trailer kingpin with respect to the fifth wheel stand. In accordance with this invention, the fifth wheel stand itself may be moved a limited amount to adjust its latching device to the trailer kingpin.

Furthermore, the spotting tolerance of the stand remains the same for a wide variety of trailer heights, both with regard to size and location with respect to the car deck.

As the fifth wheel plate structure of the stand is formed with a closed perimeter kingpin opening, it is necessarily closed on all sides and thus capable of withstanding thrust pressures applied against it in either direction when longitudinal impacts are occasioned. This is to be contrasted with conventional fifth wheel stands, which ordinarily have one end bifurcated to permit the stand kingpin latching device to be brought into engagement with the kingpin by being moved longitudinally of the trailer body as the kingpin latch device is elevated into engagement with the trailer.

The pivotal connections of the vertical and diagonal struts with the fifth wheel plate structure insure that the forces applied to the kingpin will be largely in shear and without the tensioning effect so characteristic of conventional stands. The problem of undue tension stresses being applied to the kingpin is eliminated by practicing this aspect of our invention.

As the ends of the diagonal strut are secured to the fifth wheel plate structure and the car bed, respectively, there is no need for lifting of heavy prop members to secure the vertical strut in its desired upright position; this may be done by merely applying a pin to appropriately align holes in the telescoping diagonal strut members.

An important aspect of our invention is that the vertical strut arrangements illustrated permit the stand to be manually elevated faster and with less manpower than any conventional stand arrangement that we are aware of. Thus, when our stand is employed, one man, using a ratchet device 106 of sufficient length to provide adequate leverage, can readily raise stand 10 as may be required for securing a trailer to a car for rail transit, while conventional stands require at least two men where manual operation is permitted. While power operation, as by employing a power wrench, takes most of the labor out of raising our stand, use of manually operated devices, such as ratchet device 106, reduces initial expense and repair costs and do not require the car to be at an established yard area for loading and unloading trailers. The fact that our stand is readily operated either manually or with power adapts our stand to the widest possible usage in the piggyback field.

One specific embodiment of this invention that has been successfully tested is adapted for use with trailers standing between 41 and 48 inches above the ground, spotted with the kingpin within two inches of the car center line and between one inch forward and three inches rearward of the lower vertical strut pivotal axis, and this embodiment will properly secure such trailers to railroad cars without having to adjust the trailer landing gear. The high speed lifting action of the vertical strut jacks is provided through a gear arrangement giving a 1:2 gear ratio while the low speed lifting action gives a 2.625:1 gear ratio. The pin receiving holes of the diagonal strut members will find alignment with a relative movement of about 7/8 inch between these members, in this embodiment of the invention.

The foregoing description and the drawings are given merely to explain and illustrate our invention and the in-

vention is not to be limited thereto, except insofar as the appended claims are so limited, since those skilled in the art who have our disclosure before them will be able to make modifications and variations therein without departing from the scope of the invention.

We claim:

1. A fifth wheel stand for railroad cars comprising a vertical strut pivotally mounted at one end thereof for movement about a generally horizontal axis, means for maintaining said axis against movement laterally thereof, a diagonal strut, means for pivotally mounting one end of said diagonal strut at a position spaced from said vertical strut one end for movement about a generally horizontal axis that is parallel to and lies in a horizontal plane that is at least adjacent to the horizontal plane of said first axis, means for pivotally connecting said struts together for movement about a horizontal pivotal axis that parallels the first mentioned axes, and a fifth wheel plate structure operatively secured to at least one of said struts, said diagonal strut one end pivotal mounting means including cushioning means for resiliently restraining movement of said diagonal strut one end in a horizontal plane paralleling said planes.

2. A fifth wheel stand for railroad cars comprising a vertical strut pivotally mounted at one end thereof for movement about a generally horizontal axis, means for maintaining said axis against movement laterally thereof, a diagonal strut, means for pivotally mounting one end of said diagonal strut at a position spaced from said vertical strut one end for movement about a generally horizontal axis that is parallel to and lies in a horizontal plane that is at least adjacent to the horizontal plane of said first axis, means for pivotally connecting said struts together for movement about a horizontal pivotal axis that parallels the first mentioned axes, a fifth wheel plate structure operatively secured to at least one of said struts, said diagonal strut comprising a pair of telescoping members, means for maintaining said diagonal strut members in secured together relation when said vertical strut is disposed in an upright position, said diagonal strut one end pivotal mounting means including cushioning means for resiliently restraining movement of said diagonal strut one end in a horizontal plane paralleling said planes.

3. A fifth wheel stand for railroad cars including a vertical strut, a diagonal strut pivotally secured adjacent one end thereof to the vertical strut for positioning in bracing relation thereto and for pivotal movement with respect thereto in a substantially vertical plane, a fifth wheel plate structure carried by one of said struts, a base for said stand, means for pivotally securing said vertical strut to said base for swinging movement about a substantial horizontal axis that extends crosswise of said plane, means for maintaining said axis against movement laterally thereof, and means for securing the other end of said diagonal strut to said base for movement toward and away from said vertical strut, said diagonal strut securing means comprising a cushioning arrangement comprising spaced stop members fixed with respect to said base and disposed in a substantially horizontal plane, said stop members being aligned in a vertical plane that is parallel to the first mentioned vertical plane, a group of resilient pads interposed between said stop members, a follower interposed between said group of pads and each stop member, an elongate member extending through said pads and said followers and disposed substantially parallel to said horizontal plane, and means for securing the other end of said diagonal strut to said elongate member, said elongate member including abutment means for pressing the respective followers against said pads on movement of said diagonal strut one end in either direction parallel to said horizontal plane, whereby said fifth wheel stand plate structure and loads carried thereby are cushioned against the impetus of shock applied in either direction parallel to said elongate member.

4. A railroad car fifth wheel stand comprising a fifth

wheel plate structure including a plate member defining forward and rearward ends at forward and rearward ends of the stand with said plate member being formed with an elongate closed perimeter opening adjacent its median portion, said opening extending laterally of said plate member and transversely of the stand, a pair of jaws mounted in said opening for movement toward and away from each other and sidewise of said plate member and stand, said jaws being formed with diametrically opposed kingpin seat portions, means for moving said jaws toward and away from each other, and spaced abutment members carried by said plate structure and disposed between said jaws in opposed relation at the forward rearward sides of said opening, said abutment members being spaced from each other a distance to receive between them a trailer kingpin and defining opposed wear surfaces against which the kingpin is adapted to bear when a trailer kingpin is received in said opening and said jaws have been applied to the kingpin, a base plate structure, said means for moving said jaws comprising ratchet means comprising an elongate handle member secured to said plate member in depending relation beneath same and a ratchet mechanism means operatively secured between said handle member and said jaws for actuating said jaws, and lock means for securing said handle member in an inoperative substantially horizontally disposed position, a pair of vertical struts pivotally secured at like ends thereof to said base plate structure for movement about coincident horizontal axes extending transversely of the stand, means for maintaining said axes against movement laterally thereof, said struts being spaced apart laterally of the stand, a diagonal strut, means for pivotally securing one end of said diagonal strut to said base plate structure at a position spaced from said vertical strut like ends for movement about a generally horizontal axis that is parallel to and lies in a horizontal plane that is at least adjacent to the horizontal plane of said first axes, and means for pivotally connecting said struts to said fifth wheel plate structure, said diagonal strut one end pivotal securing means including cushioning means for resiliently restraining movement of said diagonal strut one end in a horizontal plane paralleling said planes, said ratchet means handle member being mounted to swing in a vertical plane that extends longitudinally of the stand, and said handle member being disposed between said vertical struts.

5. In a fifth wheel stand for a railroad car, said stand comprising a lift structure and a fifth wheel plate structure carried by said lift structure, said lift structure comprising a first strut, means for pivotally mounting said first strut at one end thereof for swinging movement in a substantially vertical plane forwardly and rearwardly of the stand between a substantially upright raised position and a substantially horizontal lowered position, a second strut, means for pivotally mounting one end of said second strut for movement toward and away from said one end of said first strut in said vertical plane, said other ends of said struts being pivotally secured to said plate structure, said struts each comprising a pair of telescoping members and said first strut including jack means for moving said members thereof between extended and retracted positions, said first strut in being swingable about said one end thereof between said substantially upright position and said substantially horizontal position thereby disposing said fifth wheel plate structure in an elevated position and in a lowered inoperative position, respectively, said fifth wheel plate structure comprising a planar member formed with a closed perimeter opening adjacent the median portion thereof for receiving kingpins of trailers and the like and including a latching device for securing said fifth wheel plate structure to the kingpin, said means for pivotally mounting said one end of said second strut including cushioning means for resiliently restraining said movement of said one end of said second strut forwardly and rearwardly of the stand, latch means for securing said members of said

second strut together when said first strut is moved to an upright position, said jack means being operable to move said fifth wheel plate structure between said elevated position and an elevated operative position to dispose the kingpin within said opening of said planar member.

6. The stand set forth in claim 5 wherein said latch means includes means for selectively securing said members of said second strut together in the positioning required to prop said first strut in the position in which said opening of said planar member is aligned with the kingpin.

7. The stand set forth in claim 5 wherein said jack means comprises a manually operable jack.

8. The stand set forth in claim 5 including power means for operating said jack means, and means for selectively latching said jack means against operation in the extended position of said members of said first strut.

9. The stand set forth in claim 5 wherein one of said members of said second strut includes said other end of said second strut and the other of said second strut members includes said second strut one end, and wherein said cushioning means comprises a slider member having oppositely extending end projections extending normally of said vertical plane secured to said one end of said second strut, said slider member being mounted for movement forwardly and rearwardly of said stand, said slider member end portions being respectively operatively secured to cushioning devices.

10. The stand set forth in claim 5 wherein one of said members of said second strut is secured to said fifth wheel plate structure, wherein the other member of said second strut comprises a pair of links spaced apart laterally of said vertical plane, and wherein said cushioning means comprises a pair of spaced slider members, said links being respectively secured to the respective slider members, and a cushioning device secured to each of said slider members.

11. In a fifth wheel stand for a railroad car, said stand including a vertical strut and a diagonal strut with the diagonal strut extending generally forwardly of the stand, and with the struts being pivotally secured at like ends to a fifth wheel plate structure and the vertical strut being pivotally mounted at its other end and the diagonal strut having its other end mounted for movement forwardly and rearwardly of the stand, a cushioning arrangement therefor comprising spaced stop members fixedly mounted in position and spaced apart longitudinally of the direction of movement of said diagonal strut other end, a plurality of resilient pads interposed between said stop members in pre-stressed condition, a follower interposed between said pads and each stop member, a tubular member extending longitudinally of said direction of movement and through said pads and said followers and to either side of said stop members, said pads resiliently gripping said tubular member, a rod extending through said tubular member and said followers and having its end portions projecting outwardly beyond said followers, with the other end of said diagonal strut being mounted on one of said end portions of said rod and engaging the adjacent follower, said rod including an abutment member keyed to the other end portion of said rod and proportioned to bear against the follower adjacent said other end of said rod, whereby said fifth wheel stand plate structure and loads carried thereby are cushioned against the impetus of shock applied in either direction parallel to said rod.

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