May 17, 1960 J. MARKESTEIN ET AL 2,936,983

SEMITRAILER KING-PIN LOCKING AND SUPPORTING MEANS

Filed Oct. 4, 1954 4 Sheets-Sheet 1

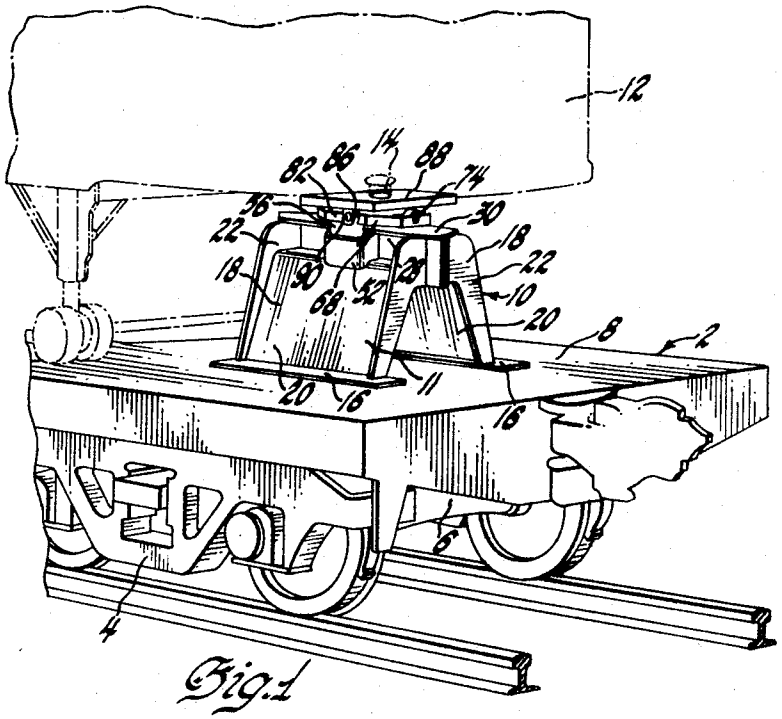


Fig. 1

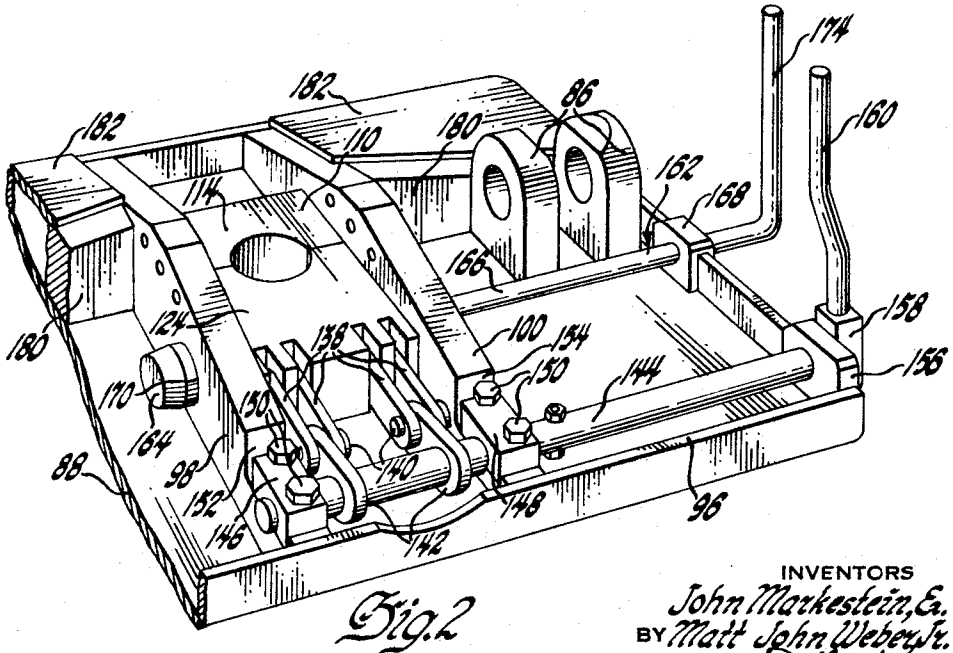


Fig. 2

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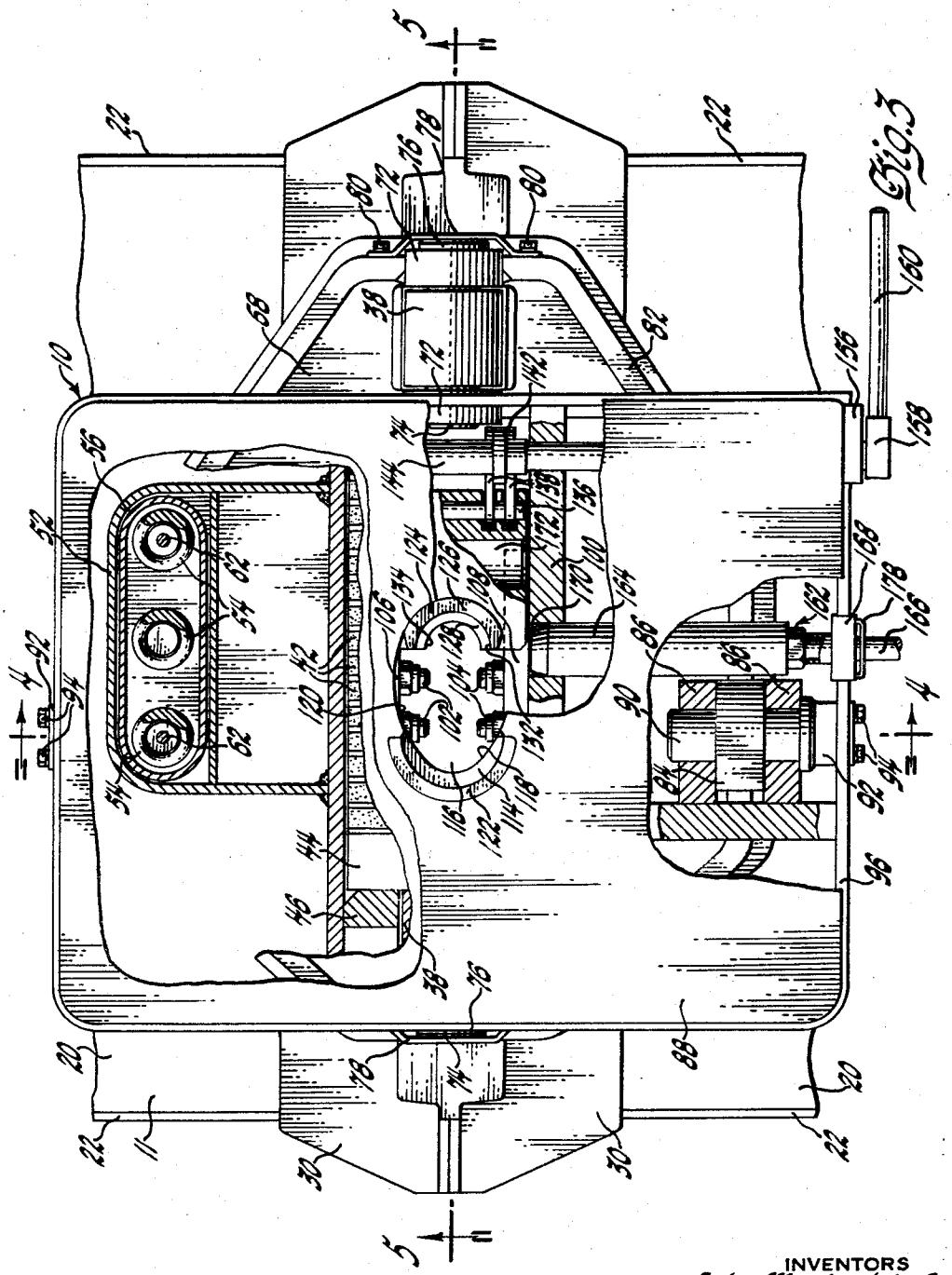


Fig. 3

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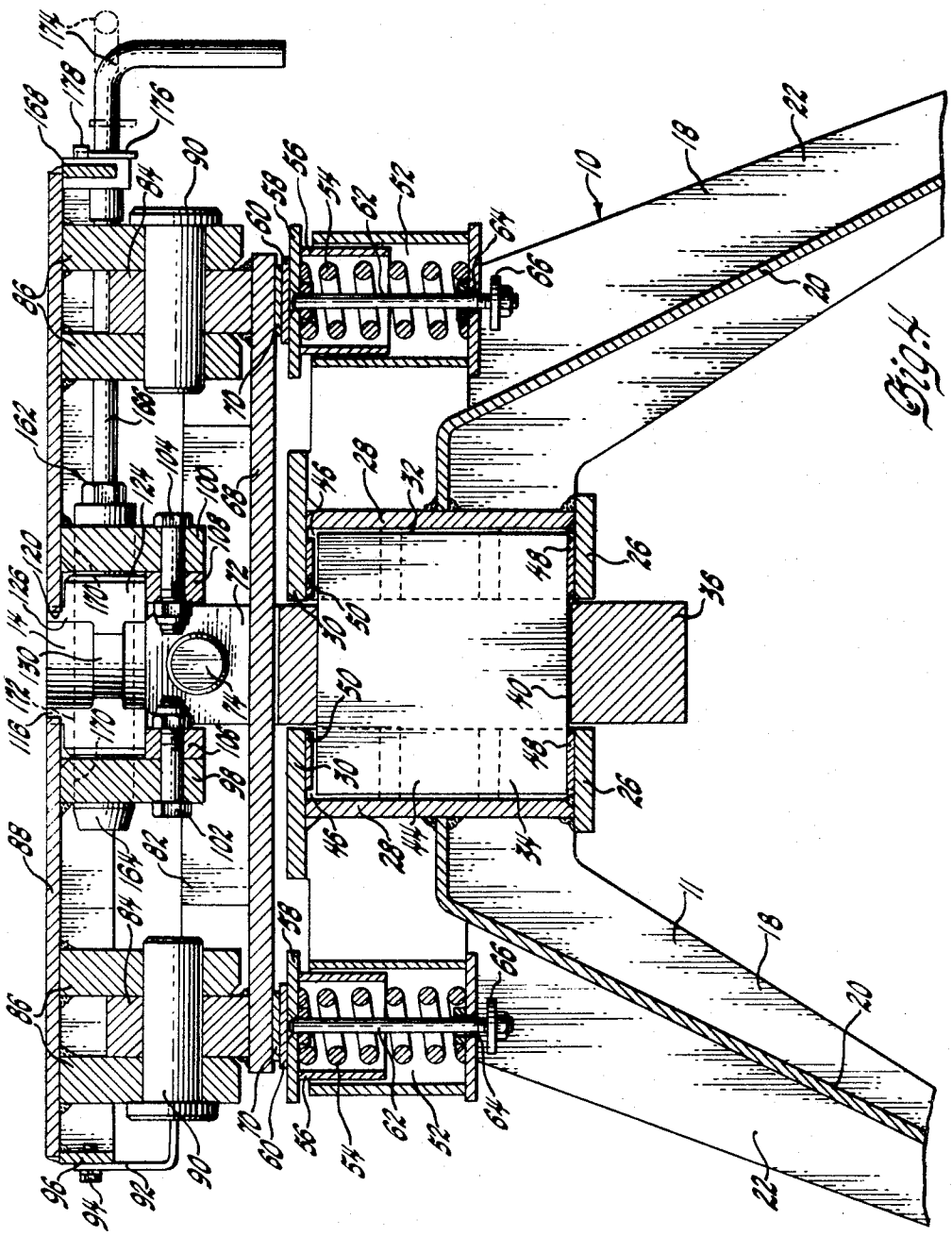


Fig. 4

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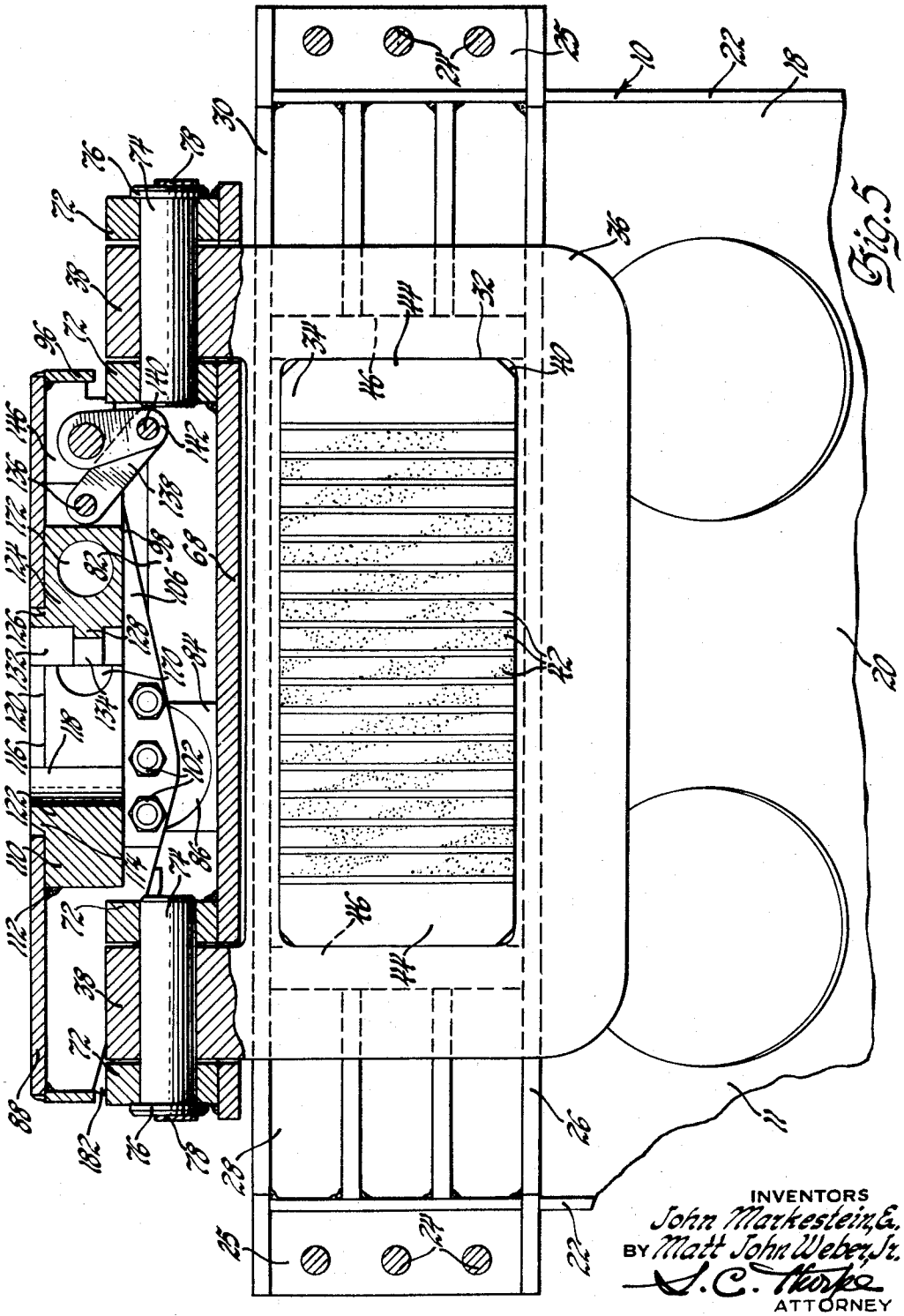


Fig. 5

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SEMITRAILER KING-PIN LOCKING AND SUPPORTING MEANS

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This invention relates generally to shock absorbing means for use in combination with railway vehicles and more particularly to semitrailer king-pin receiving and supporting means for railway vehicles adapted to transport motor truck semitrailers. In using railway vehicles to transport motor truck semitrailers it has been found that the means presently used to secure and support semitrailer king-pins to the railway vehicle are extremely susceptible to failure unless the parts thereof are made of such a size as to be almost intolerable. The reason for this high failure of such king-pin receiving and supporting means appears to lie in the fact that although longitudinal shock absorption has been provided in such means to prevent the transmittal of longitudinal shock between railway vehicles and the semitrailers carried thereon, no adequate means for absorbing vertical or lateral shock has been provided. Moreover, it has been found that with the king-pin supporting means presently in use the lateral or rolling or vertically applied shock forces to which such cars are subjected impose stresses and strains on the king-pins of the semitrailers which may tear them loose from their mountings or cause them to structurally fail altogether. On the other hand, it has been found that the present invention, by providing some lateral rolling or universal movement for the king-pin supporting means so that the king-pin may "tip" or be inclined with respect to the railway vehicle, has practically eliminated failures of such means and the king-pins supported thereby without any substantial increase in the size or weight of the various components of the supporting means. The means has been further improved by providing vertical cushioning of the king-pin relative to the cars on which these semitrailers are carried and frictionally damping all movements of the king-pin relative to the car.

It is therefore proposed as an object of this invention to provide a semitrailer king-pin receiving and supporting assembly adapted to be mounted on railway vehicles for transporting semitrailers which not only provides shock absorbing means tending to reduce the transmittal of longitudinal shocks between such vehicles and semitrailers carried thereon but also allows cushioned vertical movement of the semitrailer king-pins relative to the vehicles as well as slight "tipping," lateral rolling, or universal movement of these king-pins relative to these railway vehicles, wherein preferably all such movements are frictionally damped.

For a fuller understanding of this and other related objects of the present invention reference may be had to the accompanying detailed description and drawings, in which:

Fig. 1 is a fragmentary view in perspective of one end of a railway vehicle showing the new king-pin receiving and supporting means mounted thereon and a portion of one end of a semitrailer shown in dotted lines to indicate how the king-pin thereof is supported on the railway vehicle.

Fig. 2 is an enlarged inverted view in perspective of the upper plate of the king-pin receiving and supporting means which illustrates certain details of the jaws and jaw actuating and locking assemblies for retaining the king-pin immovable relative to the plate.

Fig. 3 is a view in plan of the king-pin receiving means with portions of the upper plate broken away to illustrate how the upper plate is resiliently supported by the foundation of the king-pin supporting means and pivotally attached to a second plate which is also pivotally attached but indirectly to the foundation.

Fig. 4 is a transverse sectional view in elevation taken on the line 4—4 of Fig. 3 looking toward an end of a railway vehicle when the king-pin receiving and supporting means is mounted thereon and illustrates how the lower plate is resiliently supported at its lateral edges on the foundation of the king-pin supporting means.

Fig. 5 is also a section in elevation taken on the line 5—5 of Fig. 3 and illustrates the draft gear acting between a yoke attached to the lower pivoted plate and vertical abutting plates on the foundation of the semitrailer king-pin supporting means to absorb longitudinal shocks tending to be transmitted between the vehicle and the semitrailers transported thereon.

Referring now to the accompanying figures and more particularly to Fig. 1, a railway vehicle indicated generally by the numeral 2 is shown provided with the usual supporting truck assemblies 4 including wheel and axle sets 6. Disposed immediately above the truck assemblies 4 are platforms 8 adapted to have secured thereto as by welding, bolts or other suitable means the semitrailer king-pin locking and securing means forming the main subject matter of this invention and indicated generally by a numeral 10.

To illustrate in part the operation of the device 10 a portion of a motor truck semitrailer has been shown in dotted lines and is indicated by a numeral 12. The semitrailer 12 is provided with the usual semitrailer king-pin 14 at the forward end thereof which is received and supported by the device 10. The device 10 includes a foundation 11 which comprises a pair of flat plates or skids 16 which, as already mentioned, may be welded or otherwise suitably secured to the upper side of platform 8. Welded or otherwise secured to the flat plates or skids 16 are upwardly converging legs 18 formed of longitudinally extending, essentially vertical flat plates 20 reinforced at opposite ends by means of flange plates 22 welded or otherwise suitably secured thereto. The legs 18 are secured together at their upper ends by means of bolt and nut assemblies 24 extending through flanges 25 secured or formed on flange plates 22. It will be observed from Fig. 4 that built in between the legs 18 by means of plating 26, 28, 30 is a draft gear pocket 32 for the reception of a flexible draft gear, the general details of which are best shown in Fig. 5. The draft gear 34 includes a substantially U-shaped yoke 36 provided with a pair of longitudinally spaced, upwardly extending bosses 38 and a window 40. Extending through the window 40 so that it protrudes on either side thereof is a compressible, resilient wafer assembly 42. This resilient assembly 42 extends longitudinally when the king-pin supporting and receiving means is mounted on the car 2 and is provided at either end with a chafing plate 44. The chafing plates 44 also extend laterally through window 40 so that they protrude on either side of the yoke 36. The plates 44, as observed in Figs. 3, 4 and 5, are adapted to engage reinforced, longitudinally facing stationary chafing plates 46 welded or otherwise suitably secured to opposite ends of the foundation 11 of the semitrailer king-pin locking and supporting means 10. The plates 26 and 30 are provided with lower and upper chafing plates 48 and 50, respectively, located in pocket 32. The plates 48 and 50 tend to limit the vertical movement of the resilient wafer assembly 42 and the yoke 36

relative to the foundation 11. Welded or otherwise suitably secured to the upper portions of plates 20 are oppositely disposed spring pockets 52. The spring pockets 52 are formed on the foundation 11 of the semitrailer king-pin supporting and securing means 10. The pockets 52 are each provided with a plurality of upwardly extending helical coil springs 54 which resiliently support an elongated plunger 56 built so as to provide downwardly facing spring seats for the helical springs 54. The plungers 56 are made up of an elongated cylindrical portion capped by a plate 58 which in turn has secured thereto an upwardly facing chafing plate 60. To prevent separation and loss of the plungers 56 from pockets 52 anti-separating rods 62 have been provided which are secured at one end of plate 58 and extend through springs 54 and holes 64 in the bottoms of pockets 52, the lower ends of the rods 62 being provided with retaining washer and nut assemblies 66. Supported on the chafing plates 60 for sliding movement with respect thereto is a plate 68 having downwardly facing chafing plates 70 which cooperate with and frictionally engage the upwardly facing chafing plates 60. Plate 68 has longitudinally spaced along the center thereof and at either end upwardly facing pairs of bosses between which the bosses 38 of the yoke 36 extend. The sets of bosses 72 are pivotally secured to an associated boss 38 by means of pins 74 which allow the plate 68 to pivot or "tip" about the axes of pins 74 extending longitudinally when the semitrailer king-pin locking and securing means 10 is mounted on the car 2. The pins 74 are held in place so that flanges 76 thereof abut the outer of the bosses 72 by means of securing straps 78 bolted as by bolts 80 or otherwise suitably secured to an upwardly extending skirt 82 welded around the edge of plate 68. As best observed in Figs. 3 and 4, plate 68 has welded thereto a pair of laterally, oppositely disposed bosses 84 extending upwardly between sets of downwardly extending bosses 86 secured to an upper plate 88. The plate 88 is pivotally supported on plate 68 by fastening each set of bosses 86 and a boss 84 with pins 90. The pins 90 are retained in place in the holes of the bosses 86 and 84 by means of small annular plates 92 which are secured by studs 94 to a downwardly depending skirt 96 attached around the outer edge of plate 88. The plate 88 is an element of the king-pin receiving and locking portion of the entire assembly 10. It will be observed from the figures and especially Fig. 2 that plate 88 has secured to the under side thereof a pair of vertical, longitudinally extending, parallel plates 98 and 100 whose ends are also secured to the inner surface of the skirt 96. Secured to the lower edges of plates 98 and 100 by means of bolt and nut assemblies 102 and 104 are a pair of supporting plates 106 and 108. The plates 106 and 108 act as partial support for a stationary jaw 110 which is secured to the under side of plate 88 by welding as at 112 and has an upward projection 114 whose upper surface is flush with the upper surface of plate 88. It will be observed that the projection 114 extends upwardly into a hole or opening 116 in the center of plate 88 and is formed so that the vertical surface 118 thereof fairs smoothly with the vertical surface 120 defining the opening 116 in plate 88. The notch 122 formed between the projection 114 and plate 88 enables the stationary jaw 114 to be welded to plate 88 so that an extremely rigid and strong joint is made between the stationary jaw 110 and plate 88.

Also supported on the vertical plates 106 and 108 for longitudinal sliding movement with respect thereto is a movable jaw 124. The jaw 124 in its retracted position; that is, when it is farthest from the stationary jaw 110, has an upward projection 126 which smoothly abuts all portions of the vertical surface defining the opposite end of the opening or hole 116. The movable jaw 124 is provided with a shoulder 128 which is adapted to engage in an annular groove 130 provided in the usual semitrailer king-pin such as the one exemplified in Fig. 4 which, as already mentioned, has been indicated by the numeral 14. It will be observed that the vertical king-pin engaging surfaces 132 and 134 of the movable jaw 124 are cylindrical in form to conform to the cylindrical surfaces of the king-pin 14. In order to move the jaw 124 along tracks or ways provided by vertical plates 106 and 108 the jaw is pivotally attached by pins 136 to sets of links 138 which in turn are pivotally secured by means of pins 140 to bell cranks 142. The cranks 142 include a shaft 144 which is journalled for rotation by means of bearing blocks 146 and 148 secured by studs 150 to plates 98 and 100 in notches 152 and 154 cut therein. The shaft 144 is also journalled for rotation by means of a bearing block 156 forming an enlarged part of the skirt 96 at a corner thereof. Attached to an end of shaft 144 extending through the bearing block 156 by means of an attaching block 158 is an operating handle 160.

A locking pin assembly to lock the movable jaw 124 in the position in which it is shown in Fig. 2 so that the king-pin is securely clamped between jaws 114 and 124 is indicated by a numeral 162. This assembly 162 includes a locking pin 164 secured to a rod 166 which is guided by means of a block 168 having a hole therethrough and forming an enlarged portion of the aforementioned skirt 96. With the movable jaw 124 in the position shown in Fig. 2 the pin 164 may be pushed through aligned holes 170 provided in the vertical plates 98 and 100 as well as a cooperating hole 172 in jaw 124. In order to move the pin 164 in and out of the holes 170 and 172 in the manner described the end of rod 166 extending outside of the skirt 96 is bent so as to form an operating handle 174. Interposed between the handle 174 and the block 168 and immediately adjacent thereto when the pin 164 is in the position shown is a small locking plate 176. This locking plate is formed in such a way that the handle 174 must be turned to remove a portion of the plate 176 extending upwardly into a recess formed by the block 168 and a small band 178 secured thereto. In other words, with the handle 174 hanging down under the force of gravity as shown in Fig. 4 the rod 166 with the pin 164 could not be withdrawn from the holes 170 and 172. It is first necessary to turn the handle 174 at least through an angle of 90° before the pin may be withdrawn.

To suitably reinforce the upper plate 88 at the point where most of the weight of the front end of the semitrailer is resting thereon suitable reinforcing plates 180 have been provided to which are secured reinforcing, relatively large gusset plates 182.

The operation of this new semitrailer king-pin securing and locking means is as follows: assuming a semitrailer such as 12 is maneuvered onto the car 2 and the king-pin 14 thereof is located in the opening 116 with the jaw 124 in the retracted position as shown in Fig. 5, the handle 160 may be turned so that the links 138 and the bell cranks 142 tend to straighten out thereby causing the surfaces 132 and 134 of movable jaw 124 to engage king-pin 114 and move it toward the stationary jaw 110 until it is clamped between jaws 118 and 124 as shown in Figs. 2 and 4. Once the king-pin is properly clamped between jaws 118 and 124 the pin 164 may be inserted through plates 98 and 100 as well as movable jaw 124 and locked in place, as already mentioned, by turning the handle 174 so that it is more or less horizontal and so that the small locking plate 176 may be moved under the band or strap 178 so that it will extend upwardly into the recess formed when the handle 174 is lowered as shown in Fig. 4. Once the semitrailer is clamped in place by means of its king-pin on plate 88 it will be observed that the plate 88 may rock or "tip" about a transverse axis through the pins 90. Slight lateral "tipping" of the plates 88 and 68 as a unit may also take place about a longitudinal axis through the pins 74. This lateral "tipping" will of course be cushioned by the springs 54 and is made possible by the clearances indicated in

the drawings between the yoke 36 and plate 68 and between the draft gear 34 and chafing plates 50, not to mention the fact that the draft gear 34 is made of resilient material. In other words, there is a certain amount of universal play between the foundation 11 of the assembly 10 and the king-pin 14 which is locked or anchored to plate 88 by the means provided on the under side thereof. This slight play, as already described, is cushioned and, as may be readily observed, is damped by sliding movement between plates 70 and 60. This slight "tipping" and universal movement which is provided between the king-pin and the foundation relieves the tremendous forces which are otherwise exerted on both the king-pin receiving and supporting assembly including the foundation and also the king-pin which is attached to the underside of the semitrailer when the semitrailer and the car are subjected to shocks which tend to cause rolling or vertical movement of the car. In other words, this unique universal connection including its resilient supports and the damping means not only absorbs and tends to prevent the transferral to the semitrailer of sudden shocks which cause the car to roll, move vertically or longitudinally but it also relieves the tremendous stresses and strains which would otherwise be set up by such motion.

The draft gear has primarily been provided to prevent the transferral of longitudinal shock loads to which the car is subjected from being transmitted to the semitrailer carried thereon. This is accomplished by compressing the resilient wafers of the draft gear 42 between one end of the yoke 36 and a set of the vertical plates 46 at the opposite end. Since under such conditions the plates 88 and 68 and the yoke 36 will move as a unit longitudinally relative to the foundation 11 including plates 30 the chafing plates 70 will also move longitudinally with respect to the plates 60 so that the friction exerted between the plates 70 and 60 will abet the resistance offered to relative longitudinal movement between foundation 11 and the plates 88 and 68 by the resiliency of the draft gear 34. The frictional forces present between plates 60 and 70 in addition to offering yielding resistance to movement of the semitrailer relative to the railway car will of course tend to damp any oscillatory movements which might be set up by draft gear 34 as well as any harmonic or oscillatory movements tending to be set up by springs 54.

From the foregoing description it may now be appreciated that unique king-pin receiving and supporting means for freight cars particularly adapted to transport motor truck semitrailers has been provided which by means of a novel universal joint enables the king-pin receiving and supporting means to be made as light as possible while at the same time better cushioning and absorbing all types of shocks which might be applied to

such a car and preventing their transferral to the semitrailer carried thereon. This unique king-pin receiving and supporting means also tends to relieve certain stresses which have been previously applied to semitrailer kingpins and the king-pin supporting means therefor so as to eliminate the failures in such means frequently occurring by reason of such stresses.

We claim:

1. A semi-trailer kingpin receiving and supporting means for railway vehicles adapted to transport semitrailers comprising, in combination, a foundation secured to the upper sides of such railway vehicles, a universal joint including an upper member rotatable about a transverse axis and a lower member rotatable about an axis longitudinal of such vehicles, said upper member having kingpin receiving means operable to hold a semi-trailer kingpin when inserted therein immovable thereto, intermediate means for connecting said lower member to said foundation, said intermediate means including a substantially U-shaped yoke member arranged in a vertical plane lying in the direction of travel of such vehicle and resilient shock absorbing means having fore and aft ends mounted on said foundation and acting horizontally in the direction of travel of such vehicle, said U-shaped yoke member having spaced apart upstanding leg portions, the upper ends of said leg portions forming bosses pivoted to said lower member of the universal joint, said pivotal connection forming the longitudinal rotational axis of the latter, the lower ends of said leg portions having opposed pressure faces embracing the fore and aft ends of the shock absorbing means for preventing the transmittal of shocks between such railway vehicles and any semi-trailers transported thereon with their kingpin secured in said kingpin receiving means, and vertically arranged spring means on said foundation providing resilient support of said lower member on said foundation.

2. A semi-trailer kingpin receiving and supporting means according to claim 1 including, first chafing plates connected to said lower member opposite said spring means and second chafing plates carried by said spring means, said first and second chafing plates being in frictional contact with each other for damping vibrations.

References Cited in the file of this patent

UNITED STATES PATENTS

1,380,490	Masury	June 7, 1921
1,623,427	Manrock	Apr. 5, 1927
2,099,288	Allen	Nov. 16, 1937
2,170,581	West et al.	Aug. 22, 1939
2,204,667	Dooley et al.	June 18, 1940
2,541,209	Cox	Feb. 13, 1951
2,709,969	Andert	June 7, 1955