

Jan. 26, 1965

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3,167,288

RAIL CAR SUPPORT FOR SEMI-TRAILERS

Filed May 22, 1962

2 Sheets-Sheet 1

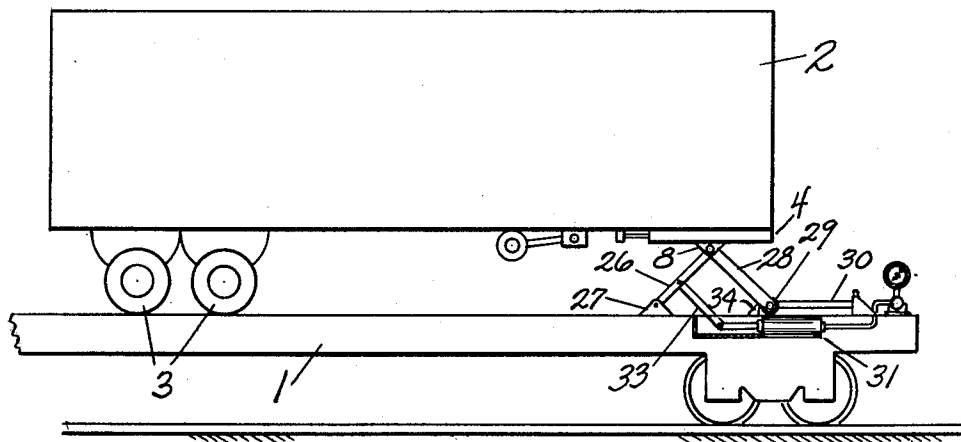


FIG. 1

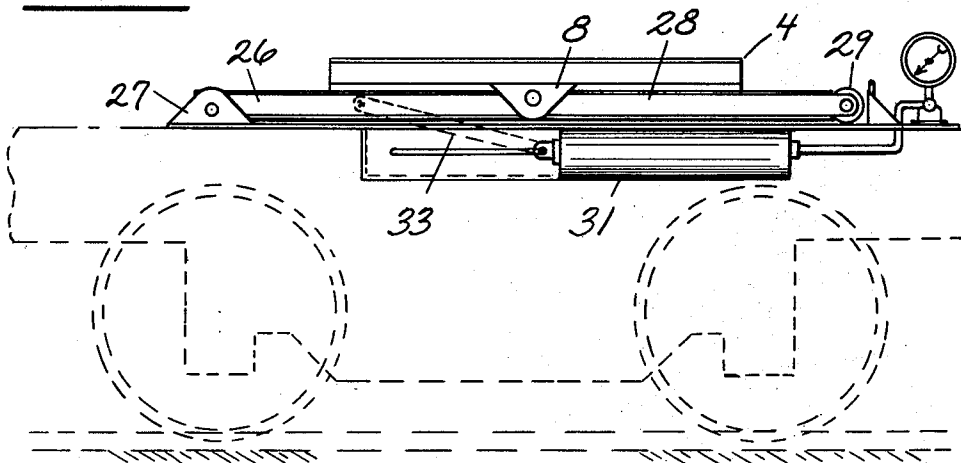


FIG. 2

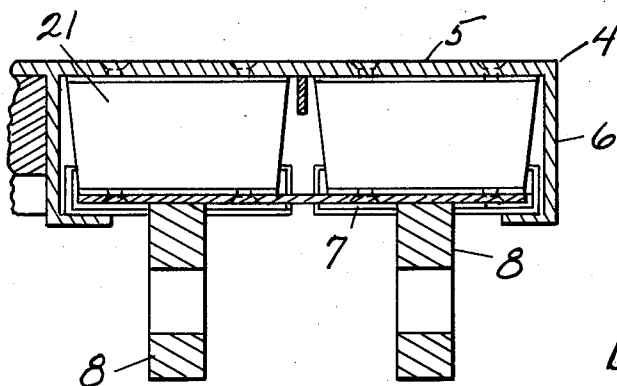


FIG. 5

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2 Sheets-Sheet 2

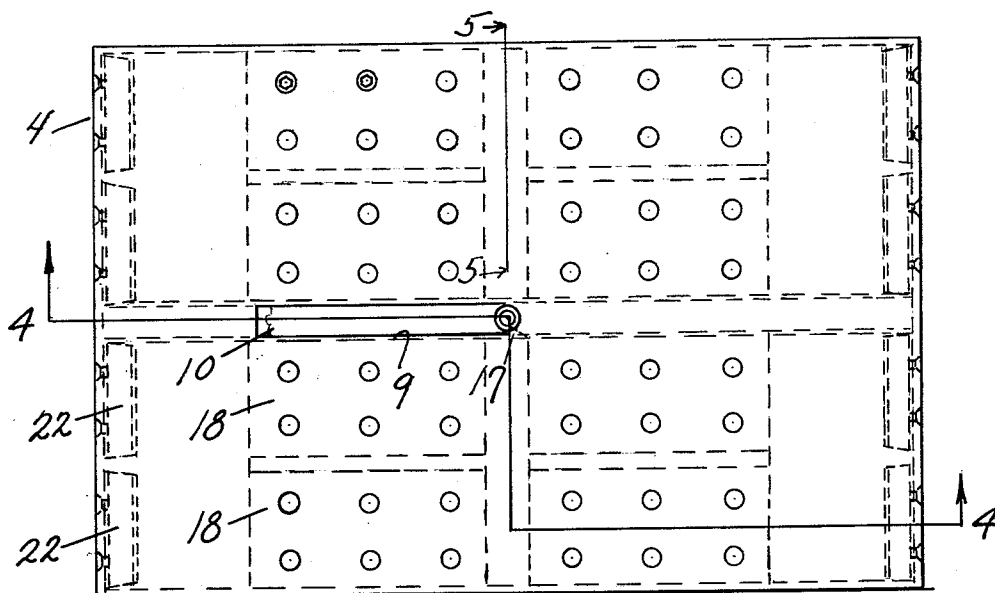


FIG. 3

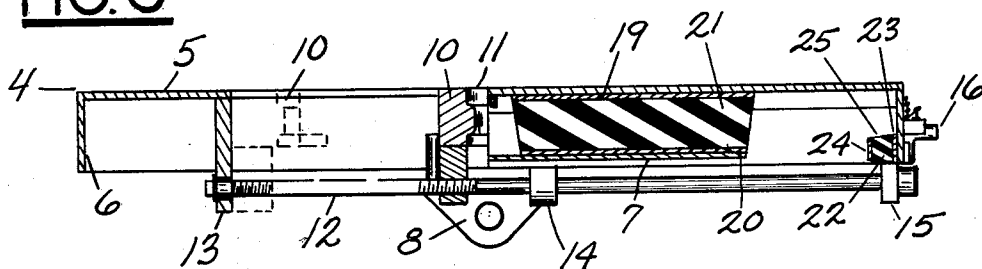


FIG. 4

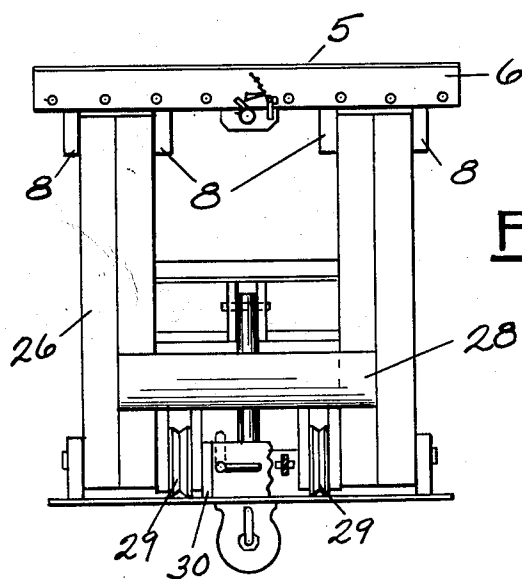


FIG. 6

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RAIL CAR SUPPORT FOR SEMI-TRAILERS

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1 Claim. (Cl. 248—119)

This invention is intended to protect semi-trailers from the shocks encountered in rail shipment by what is commonly known as piggy-back service. At the upper end of the semi-trailer stand is a body of elastomer sandwiched between and bonded to horizontal top and bottom plates providing a mounting which is stiff in a vertical direction and is soft in a horizontal direction fore and aft of the railway car. The semi-trailer kingpin is locked in the top plate. The bottom plate is fixed to the stand which in turn is fixed to the flatcar. When impact occurs in switching or humping, the stand remains stationary because it is locked to the car and the shock is absorbed by horizontal fore and aft movements of the semi-trailer without significant vertical movement.

In the drawing, FIG. 1 is a side elevation of a railway flatcar carrying a highway semi-trailer, FIG. 2 shows the support for the front end of the semi-trailer in a collapsed position, FIG. 3 is a top plan view of the support, FIG. 4 is a section on line 4—4 of FIG. 3, FIG. 5 is a section on line 5—5 of FIG. 3, and FIG. 6 is an end view of the support in the raised position.

In the drawing, 1 indicates the frame of a railway flatcar and 2 indicates a semi-trailer with rear wheels 3 supported on the floor of the flatcar and with the front end on a support 4. As shown more clearly in FIGS. 3, 4 and 5, the support 4 comprises a top plate 5 with depending peripheral stiffening flanges 6 at the sides and ends and bottom plate 7 to which are fixed lugs 8. At the center of the top plate is a guideway 9 for a kingpin locking block 10 which is movable from the full open position shown in dotted lines in FIGS. 3 and 4 to a closed position engaging the center pin 11 depending from the under side of the front end of the semi-trailer. The opening and closing movement of the kingpin locking block is through a screw 12 rotatably journaled in lugs 13, 14 and 15, depending from the underside of the top plate 5 and turned by a handle 16. When the kingpin locking block 10 is open, there is a space of about twelve inches which accommodates any off-positioning of the trailer when placed on the flatcar. The kingpin locking block 10 cooperates with a complementary block 17 fixed to the top plate 5.

Between the top and bottom plates 5 and 7 are a plurality of mountings 18, each comprising a plate 19 fixed to the underside of the top plate 5 and a plate 20 fixed to the upper side of the bottom plate 7. Sandwiched between the plates 19 and 20 is a body 21 of suitable elastomer such as natural or synthetic rubber. Vertical load on the mountings stresses the elastomer in compression while horizontal load on the mounting stresses the elastomer in shear. The elastomer is much softer in shear and provides adequate cushioning of the fore and aft impacts such as those caused during humping. In a specific design, impacts at 8 to 10 miles per hour are from 10 to 20 g and result in a relative fore and aft movement between the top and bottom plates 5 and 7 of about eight inches and a reduction on the force transmitted to the trailer kingpin to about 3 or 4 g. Fore and aft movement greater than eight inches is limited by cushioned stops 22 fixed to the inner side of the end flanges 6. Each of the stops 22 comprises a plate 23 fixed to the associated end flange,

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a plate 24 and a body 25 of elastomer sandwiched between and bonded to the plates. The stops provide cushioned limitation of the movement of the trailer.

In operation, there are critical vertical frequencies induced by the track which are in the range of from 2 to 7 cycles per second. Resonance with these frequencies is avoided by the mountings 18 because the elastomer is stiff in the vertical direction. In a specific design, the stiffness of the mountings 18 was 552,000 pounds per inch in the vertical direction resulting in a natural frequency of 18 cycles per second, which was well above the vertical disturbing frequency due to the track. This should be compared with the fore and aft or shear stiffness of the mountings of 25,000 pounds per inch resulting in a horizontal natural frequency of between 2 and 3 cycles per second. This low natural frequency does no harm because there are no major known forces exciting vibration in the horizontal direction.

The support for the plate 4 comprises links 26 pivoted at the lower ends in blocks 27 fixed to the floor of the flatcar and a link 28 having a pair of wheels 29 at the lower end riding in tracks 30 on the floor of the flatcar. The upper ends of the links 26 and 28 are pivoted to the lugs 3 on the underside of the bottom plate 7. The links 26 and 28 are movable between a lowered position shown in FIG. 2 to an upper position shown in FIG. 1 by a device such as a pneumatic piston 31 having a piston rod 32 connected to one end of a link 33. The other end of the link 33 is connected to one of the links 26. In the raised position, the link 28 butts against a stop 34, thereby accurately positioning the supporting plate 4 above the bed of the flatcar and the links 26 and 28 serve as a stand which is fixed or locked to the car. In the lower position shown in FIG. 2, the links 26, 28 and the plate 4 project only a slight distance above the bed of the flatcar.

Under impact, the semi-trailer moves fore and aft relative to the car without any vertical reaction. If the center of gravity is above the support 4 (as is usually the case) there is a moment tending to lift up one end of the trailer and press down the other end but this moment is resisted by the rigidity of the stand 26—34 and by the stiffness of the mountings 18 in the vertical direction. The support 4 confines the movement of the front end of the trailer to a plane parallel to the floor of the flatcar and the rear wheels have the same effect on the back end of the trailer. There is no rocking or pitching. Motion during impact occurs in the elastomer only, and not as sliding action on rigid surfaces.

What is claimed as new is:

In combination with a semi-trailer having a fifth wheel and kingpin, a supporting structure, a lower horizontal plate mounted in load carrying relation to the supporting structure, an upper horizontal plate spaced above the lower plate in load receiving relation to the fifth wheel, means for locking the king pin to the upper plate, and a body of elastomer in load carrying relation between the plates and having horizontal upper and lower surfaces respectively united to the upper and lower plates, said body sustaining vertical load in compression and horizontal load in shear.

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