Feb. 20, 1940. R. G. ANDERSON 2,190,762

RAILWAY TRUCK

Filed March 16, 1938 2 Sheets-Sheet 1

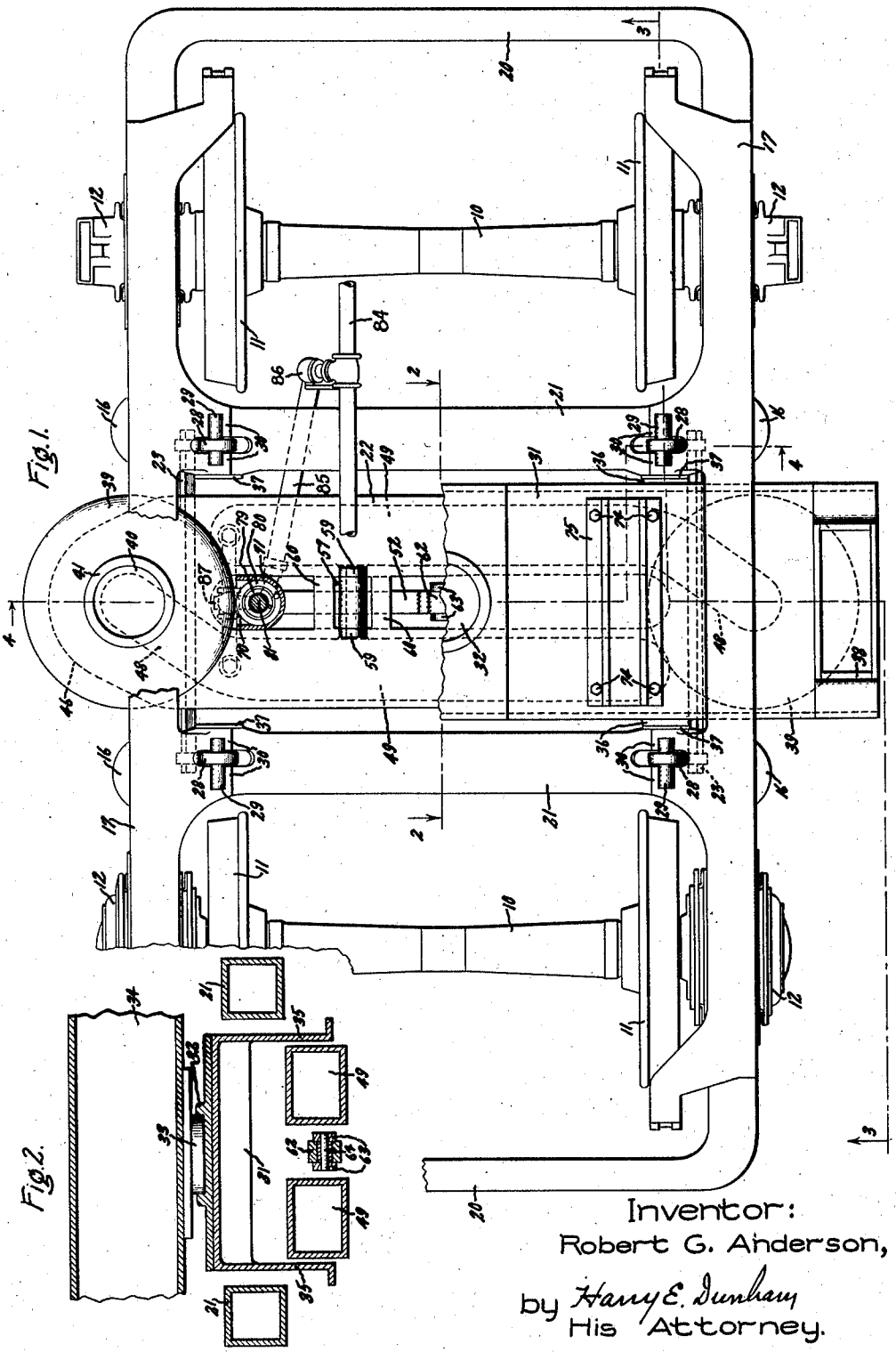

Fig. 1.

Fig. 2.

Inventor:
Robert G. Anderson,
by Harry E. Dunham
His Attorney.

Feb. 20, 1940. R. G. ANDERSON 2,190,762

RAILWAY TRUCK

Filed March 16, 1938 2 Sheets-Sheet 2

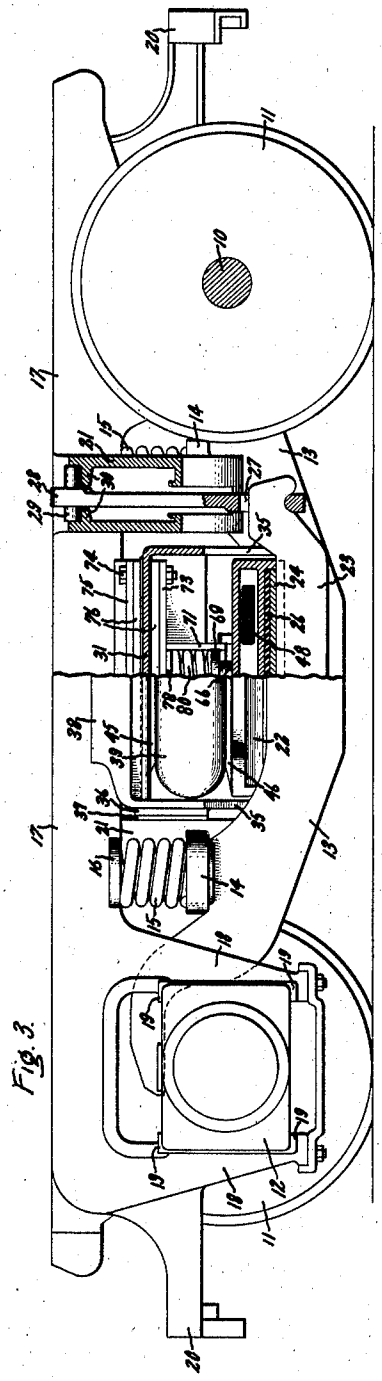

Fig. 3.

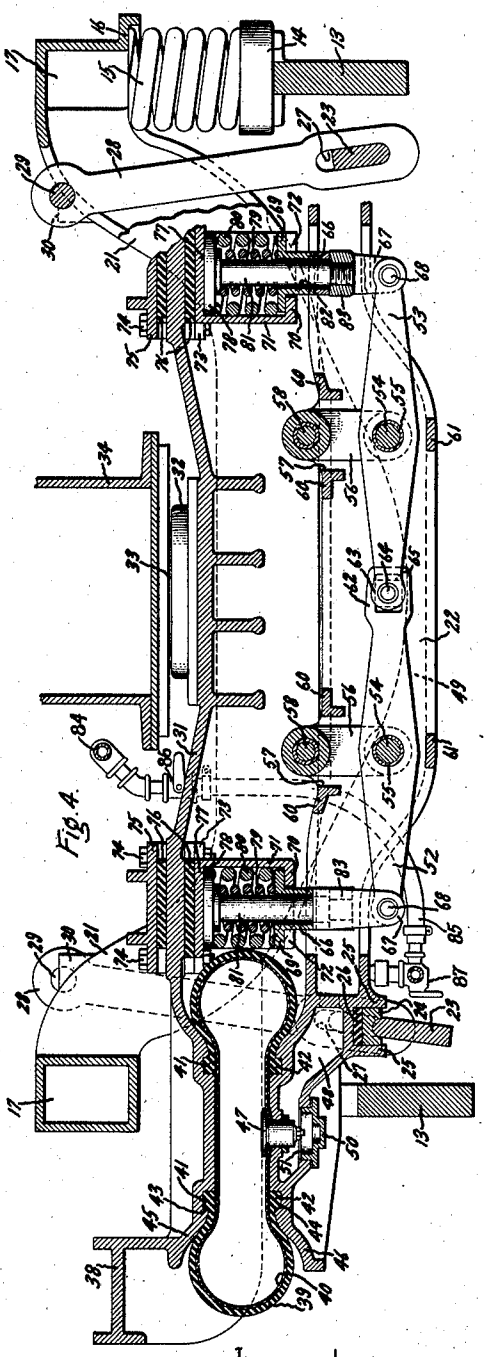

Fig. 4.

Inventor:
Robert G. Anderson,
by Harry E. Dunham
His Attorney.

Patented Feb. 20, 1940

2,190,762

UNITED STATES PATENT OFFICE

2,190,762

RAILWAY TRUCK

Robert G. Anderson, Erie, Pa., assignor to General Electric Company, a corporation of New York

Application March 16, 1938, Serial No. 196,240

6 Claims. (Cl. 105—190)

My invention relates to trucks for railway vehicles.

An object of my invention is to provide an improved resilient fluid cushion for supporting a railway truck bolster.

Another object of my invention is to provide an improved railway truck providing a flexible resilient cushion support for the vertical loads and providing a resilient mechanism for equalizing the load transversely of the sides of the truck for restraining transverse tilting thereof.

Further objects and advantages of my invention will become apparent and my invention will be better understood from the following description referring to the accompanying drawings, and the features of novelty which characterize my invention will be pointed out with particularity in the claims annexed to and forming part of this specification.

In the drawings: Fig. 1 is a plan view, partly broken away, of a railway truck embodying my invention; Fig. 2 is a sectional view taken along line 2—2 of Fig. 1 illustrating the relative arrangement of the transoms and bolsters of the truck; Fig. 3 is a side elevational view partly in section taken along line 3—3 of Fig. 1; and Fig. 4 is an enlarged sectional view taken along line 4—4 of Fig. 1.

Referring to the drawings, I have shown a truck for a railway vehicle provided with a pair of axles 10 supported by wheels 11 and journaled in journal boxes 12. A longitudinally extending equalizer 13 is arranged on each side of the truck and extends between and is mounted at each end thereof on the top of one of the journal boxes 12. The equalizers 13 are provided with spring seats 14 on which coil springs 15 are mounted, and are arranged to support the vertical load on the truck frame. The upper ends of these coil springs 15 engage spring seats 16 secured to the underside of side frames 17 of the truck frame, and these side frames 17 are provided with pedestal jaws 18 and pedestal shoes 19, which slidably engage the sides of the journal boxes 12. The truck frame is provided with end frames 20 arranged to rigidly secure together the ends of the truck side frames 17 at each end of the truck, and a pair of transoms 21 is arranged in longitudinally spaced-apart relation adjacent the central portion of the truck and extends between and joins the side frames 17 of the truck. A transversely movable swing bolster 22 is arranged intermediate the inner sides of the transom 21 and is supported thereon by longitudinally extending equalizer bars 23, which engage bearing seats 24 arranged between longitudinally extending flanges 25 formed on the underside of the bolster 22 adjacent each end thereof. A resilient rubber cushion 26 is arranged between the upper side of the bearing 24 and the underside of the bolster 22 between the flanges 25 to dampen vibrations and noise in the swing bolster support. The equalizer bars 23 are mounted at each end thereof in slots 27 formed in the lower ends of upwardly extending supporting swing links 28. These swing links 28 are pivotally supported to the upper ends thereof by pivot pins 29 pivotally mounted in bearings 30 formed on the transoms 21 adjacent the side frames 17. A second bolster 31 is arranged above the swing bolster 22 intermediate the transoms 21 and is provided with a center bearing 32 arranged to support a center bearing plate 33 for supporting a vehicle frame 34. The second bolster 31 is provided with vertically extending sides 35, which extend about the outer sides of the swing bolster 22 and are provided with transversely extending bearing or wear plates 36 arranged to engage complementary bearings 37 formed on both of the inner sides of the transoms 21 adjacent each end thereof for transmitting longitudinal forces between the truck frame and the bolster 31. The bolster 31 also is provided with side bearings 38 extending beyond the truck side frames 17, and is supported upon the swing bolster 22 by a pair of resilient fluid cushions comprising flexible annular outer casings or tires 39, made of a suitable flexible material such as a fabric impregnated with a resilient rubber composition, and within each of which is arranged a flexible expansible inner casing 40 of suitable material, such as resilient rubber. The peripheral portions of the tires 39 are of substantially U-shaped cross-section, and are provided with outwardly extending annular flanges 41 and 42 in each of the outer edges thereof which are adapted to engage complementary retaining grooves 43 and 44 formed in cushion seats 45 and 46 provided on the second bolster 31 and swing bolster 22, respectively. The outer tires 39 are arranged between the cushion seats 45 and 46 of the two bolsters and surround the outer periphery of the pneumatic inner casings 40. These inner casings are arranged to be inflated with air or other suitable fluid medium and are provided with valves 47 providing communications between the interior of the inner casings 39 and passageways 48 which form the outer ends of a pair of transversely extending pneumatic reservoirs or surge

chambers 49 formed in the swing bolster 22. These reservoir surge chambers are arranged to receive and supply the fluid medium from the cushions in accordance with the load carried thereby and provide a greater fluid capacity to each cushion, thereby increasing the resiliency thereof by providing for the compression of a relatively much larger volume of gaseous medium than that of the cushions alone. The valve 47 is constructed so as to provide for a restricted passage or flow of air from the reservoirs 49 to the inner casings 39 and to provide for a substantially unrestricted flow of air from the cushion inner casings 39 to the reservoir in order to equalize the pressure therebetween. In this manner, when pressure is applied to the pneumatic cushion which tends to compress the tire 40 and inner casing 39, an appreciable resilient resistance is offered to this compressive force by the cushion, as the air flows from the cushion inner casing 39 to the reservoir 49 and the pressure increases within the cushion inner casing 39 and the reservoir. When the compressive force upon the pneumatic cushion is relieved, the air from the reservoir returns through a restricted passage in the valve 47 to the inner casing 39, and tends to inflate the inner casing 39 and return the casing and tire to their normal expanded positions. A removable cap 50 is secured in an opening 51 formed in the lower side of the passageway 48 below the valve 47 in order to provide for any desired adjustment of the valve 47. Air may be supplied to the reservoirs 49 from an airbrake system pipe 84 through a flexible hose 85 connected thereto by a shut-off valve 86 and to the reservoirs by a three-way valve 87. This pneumatic cushion arrangement provides for the resilient support of the loads on the second bolster 31, and provides a substantially greater restraint for the rebound or return of the upper bolster 31 than for the initial or compressive force which is applied to the pneumatic cushion. This tends to dampen and restrain oscillations which may be produced by flexibility in the resilient bolster support.

In order to provide for transverse tilting with resilient restraint against excessive tilting of the truck, I provide a restraining interconnected link mechanism extending between the sides of the truck frame and arranged to equalize the forces on both sides of the truck. The interconnected link mechanism is arranged between the adjacent sides of the two air reservoirs 49 and includes two complementary sections provided with transversely extending equalizer links 52 and 53 pivotally secured intermediate the ends thereof by pivot pins 54. These pivot pins are mounted in bearings 55 in swing links 56 which extend upwardly through openings 57 in the upper portion of the swing bolster 22 and are pivotally supported by pivot pins 58 on bosses 59 formed on the upper side of the swing bolster 22 on each side of the openings 57. Tie bars 60 are formed on each side of the openings 57 and unite the upper sides of the two air reservoirs 49 formed in the swing bolster 22, and tie bars 61 are formed below the openings 57 and unite the two air reservoirs 49 at the lower edge of the swing bolster 22. The inner ends of the equalizer links 52 and 53 are pivotally and slidably connected together by a lost-motion connection including a yoke 62 formed on the end of the link 52 and a clevis 63 formed on the end of the link 53. The clevis and yoke are secured together by a pivot pin 64 which extends through the clevis and pivotally engages an opening formed in a bearing block 65 slidably arranged within the yoke 62. In order to transmit resiliently relative vertical forces between the interconnected link mechanism and the second bolster 31, the outer ends of the interconnected links 52 and 53 are resiliently secured to the bolster 31 by cushioning devices. These cushioning devices include upwardly extending hollow sleeves 66 arranged above collar members having clevised ends 67 which are pivotally secured by pivot pins 68 to the outer ends of the links 52 and 53. The sleeves 66 are formed with upper annular heads 69 supported by annular flanges 70 formed on the lower end of a pair of casings 71, and extend through openings 72 formed in the lower flanges 70 of the casings 71. These casings are formed with longitudinally extending flanges 73 secured to the upper bolster 31 by bolts 74 and upper clamping plates 75. In order to cushion vertical forces transmitted from the casings 71 to the second bolster 31 and to provide a more quiet operation of the interconnected link mechanism, a pair of cushion pads 76, formed of suitable resilient material, such as resilient rubber, are arranged between the clamping plates 75 and upper ends 77 of the casings 71. Furthermore, to transmit resiliently vertical forces in both directions, I provide upper heads 78 biased away from the lower pistons 69 by coil springs 79 and 80 and into engagement with the underside of the upper ends 77 of the casings 71. In this manner the ends 70 and 77 of the casings 71 form stops for limiting the travel of the heads 69 and 78, respectively, in these casings. The upper heads 78 are provided with downwardly extending rods 81 which extend through openings 82 extending through the sleeves 66, and nuts 83 threadedly engage the lower ends of the rods 81 between the sides of the clevises 67 and secure the rods 81 within the sleeves 66.

If the forces on the two sides of the truck are not equal, the unbalanced vertical force acting on the upper bolster 31 will tend to produce transverse tilting thereof. Such tilting causes the casing 71 on the side of the frame which is tilted downwardly to move in a downward direction, so that a downward force is transmitted to the corresponding upper head 78 which tends to compress the springs 79 and 80. These springs resiliently transmit this downward force to the corresponding lower head 69 and through the sleeve 66 to the outer pivoted end of the corresponding interconnected link 52 or 53. This tends to cause the upward movement of the lost-motion connection between the ends of the interconnected link mechanism which transmits a downward force to the outer end of the other interconnected link. This downward force is transmitted through the corresponding lower casing flange 70 and through the cushion pads 76 to the other side of the upper bolster 31. In this manner, a portion of the unbalanced force acting on one side of the upper bolster 31 is transmitted through the interconnected link mechanism to the other side of the upper bolster 31, and the downward forces upon the pneumatic spring cushions arranged between the ends of the upper bolster 31 and the lower swing bolster 22 are equalized. Any balanced vertical loads on the trucks are not transmitted through this interconnected link mechanism, as the casings 72 on both sides of the bolster 31 tend to move in the same direction, and the interconnected equalizer

links on each side of the truck tend to pivot in the same direction, and thereby do not transmit any forces between the two sections of the link mechanism on the two sides of the truck.

While I have illustrated and described a particular embodiment of my invention, modifications thereof will occur to those skilled in the art. I desire it to be understood, therefore, that my invention is not to be limited to the particular arrangement disclosed, and I intend in the appended claims to cover all modifications which do not depart from the spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A vehicle truck having a frame, a bolster element extending transversely of said truck frame, means for supporting said bolster element on said frame, a second bolster element, means including a pneumatic cushion for supporting said second bolster element on said first-mentioned bolster element, and a pneumatic reservoir surge chamber formed by one of said elements and arranged in communication with said pneumatic cushion.

2. A vehicle truck having a frame, a swing bolster element, means for supporting said swing bolster element on said frame, a second bolster element extending transversely of said truck frame, a pneumatic cushion arranged between said swing bolster element and said second bolster element, a pneumatic reservoir formed by one of said elements, means for providing a communication between said pneumatic cushion and said reservoir arranged to provide for restricted flow of fluid from said reservoir to said cushion and to provide for substantially unrestricted flow of fluid from said cushion to said reservoir.

3. A vehicle truck having a frame, a swing bolster, means for supporting said swing bolster on said frame, a second bolster, a cushion seat formed on said swing bolster, a complementary cushion seat formed on said second bolster, a pneumatic cushion arranged between said cushion seats on said bolsters, a pneumatic reservoir formed in one of said bolsters, means for providing a communication between said pneumatic cushion and said reservoir.

4. A vehicle truck having a frame, a swing bolster, means for supporting said swing bolster on said frame, a second bolster, a cushion seat formed on said swing bolster adjacent each end thereof, a complementary cushion seat formed on said second bolster adjacent each end thereof, pneumatic cushions including annular outer casings and expansible inner casings arranged between said cushion seats on said bolsters, a pair of pneumatic reservoirs formed in said swing bolster, means for providing a communication between said cushion inner casings and said reservoirs.

5. A vehicle truck having a frame, a swing bolster, means including swing links for supporting said swing bolster on said frame, a second bolster, resilient pneumatic cushions arranged between the ends of said bolster and said second bolster adjacent each side of said truck, a pair of pneumatic reservoirs formed in said swing bolster, means including a valve for providing a communication between said pneumatic cushions and said reservoirs arranged to provide for restricted flow of fluid from said reservoirs to said cushions and to provide for substantially unrestricted flow of fluid from said cushions to said reservoirs.

6. A truck having a frame, a swing bolster, means for supporting said swing bolster on said frame, a second bolster, means for movably supporting said second bolster on said swing bolster, an interconnected link mechanism including a pair of links pivotally secured together at the inner ends thereof by a lost-motion connection for equalizing the forces transversely of said truck frame, swing links pivotally connecting each of said interconnected links intermediate the ends thereof to said swing bolster, a pair of casings, and means including resilient rubber cushion pads for resiliently securing said casings to said second bolster, each of said casings being resiliently and pivotally secured to the outer ends of said interconnected links and arranged to resiliently transmit relative vertical forces between said link mechanism and said second bolster through said casings.

ROBERT G. ANDERSON.