May 21, 1946. A. F. HICKMAN 2,400,550

BOLSTER CONSTRUCTION FOR RAILROAD TRUCKS

Filed Sept. 3, 1943 2 Sheets-Sheet 1

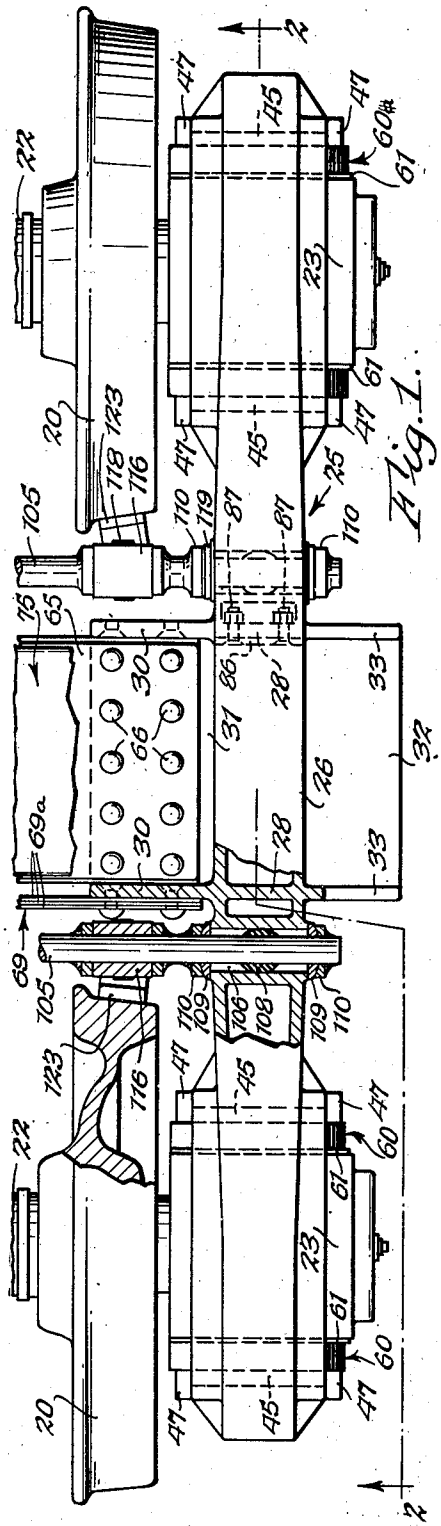


Fig. 1.

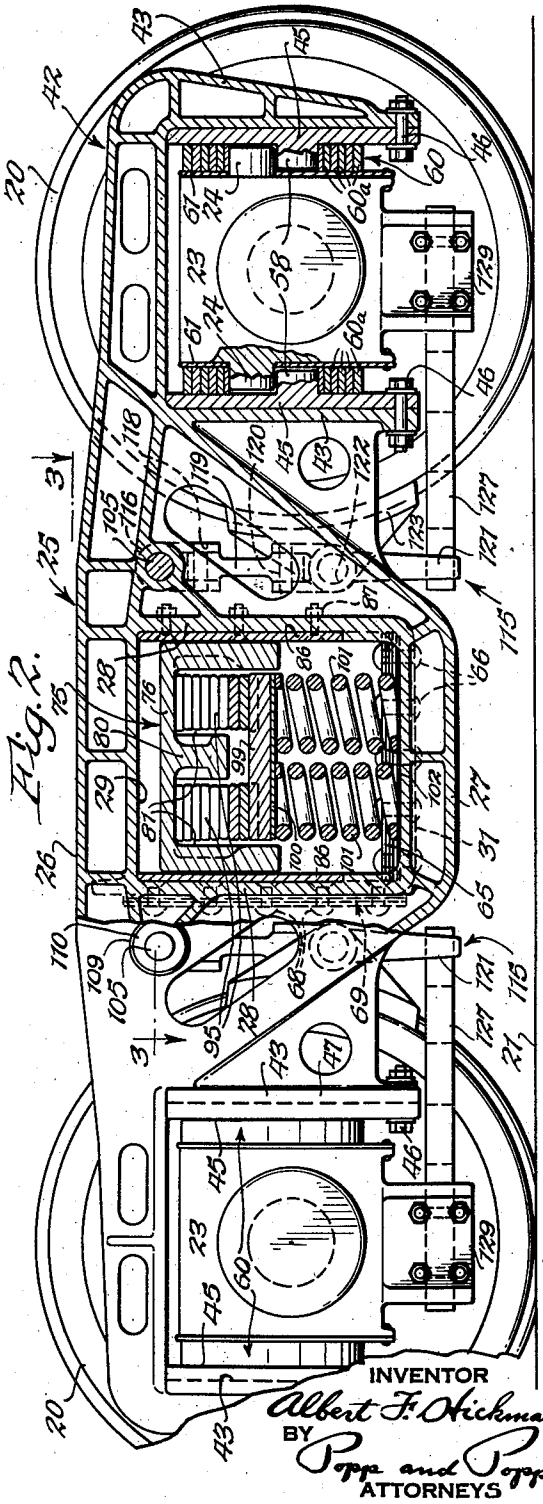


Fig. 2.

INVENTOR
Albert F. Hickman
BY
Popp and Popp
ATTORNEYS

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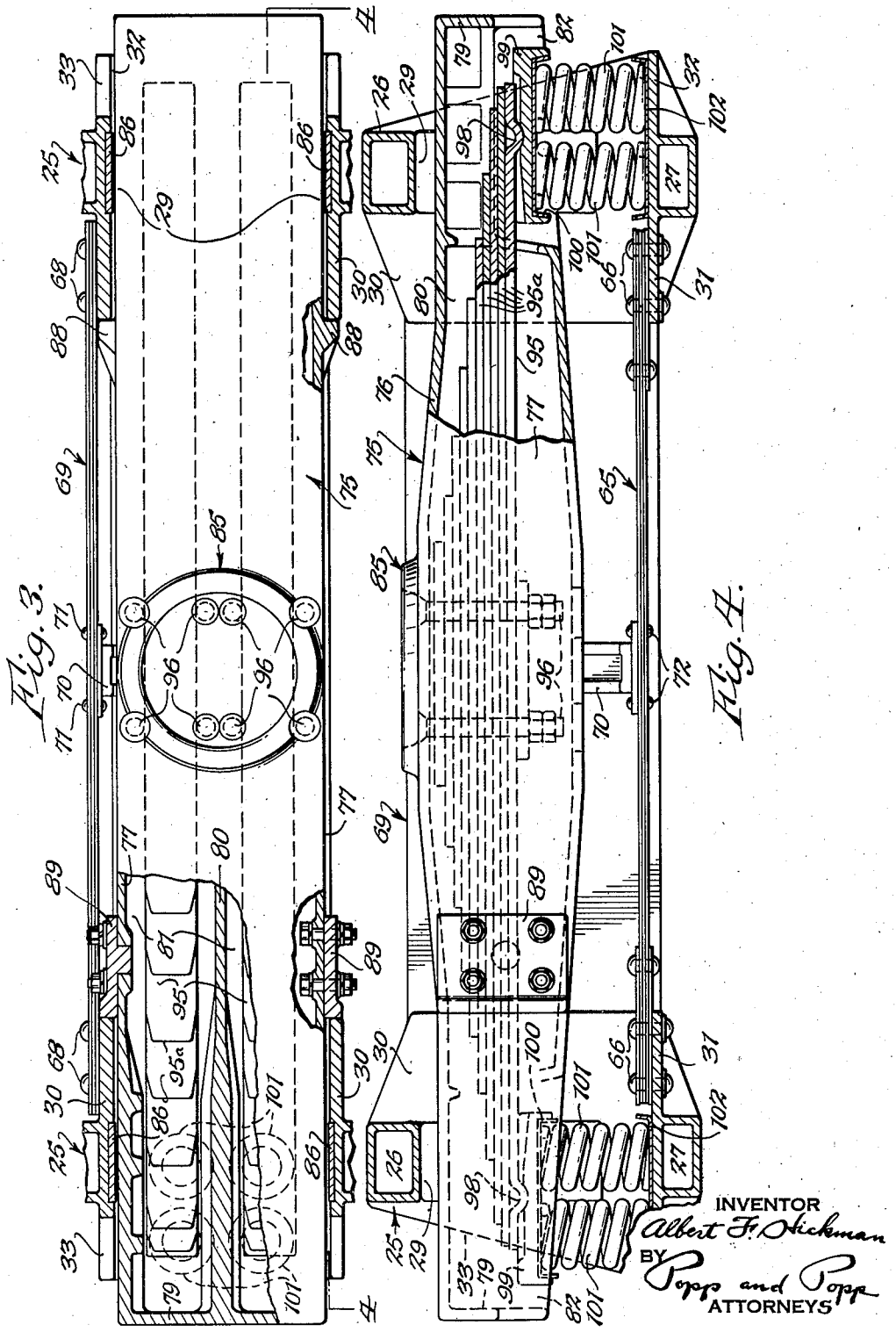


Fig. 3.

Fig. 4.

INVENTOR
Albert F. Hickman
BY
Popp and Popp
ATTORNEYS

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UNITED STATES PATENT OFFICE

2,400,550

BOLSTER CONSTRUCTION FOR RAILROAD TRUCKS

Albert F. Hickman, Eden, N. Y., assignor to Hickman Pneumatic Seat Co., Inc., Eden, N. Y., a corporation of New York

Application September 3, 1943, Serial No. 501,175

3 Claims. (Cl. 105—197.1)

This invention relates to a bolster construction for spring suspensions for railroad cars and more particularly to a bolster having a novel arrangement of the bolster springs whereby a greater degree of spring deflection is obtainable with a very light bolster construction, the bolster being particularly adaptable for railroad freight cars although the bolster can also be incorporated in the spring suspensions for passenger cars.

This application is a companion application to my copending applications for spring suspensions for railroad cars, Ser. No. 473,348 filed January 23, 1943, Ser. No. 473,824 filed January 28, 1943 and Ser. No. 476,943 filed February 24, 1943, these applications being directed to features shown but not claimed in the present application.

In common with my said copending applications one of the principal objects of the invention is to provide a spring suspension which will function to safely support the car body at high speeds, higher speeds being demanded of both freight and passenger car service.

Another object of the invention is to provide a bolster for a railway truck construction in which journal boxes, truck side frames, and axles of standard construction can be employed.

Another object is to provide a bolster for use in a spring suspension in which the suspension can be assembled in large quantities in one central plant and sold as a complete unit.

Another aim is to provide a bolster for use in a spring suspension in which all parts are well within the limits of size and movement required by present railroad standards.

Another object is to provide such a bolster and spring suspension which provides the necessary stability under all conditions of operation and also provides the desired non-destructive riding qualities.

Another object is to provide such a bolster construction which is light in weight and is adapted to be used in conjunction with lightweight bodies and equipment, such lightweight bodies and equipment being desirable with the use of increased rail speeds.

Another object of the invention is to provide a bolster adapted to be used in a spring suspension which will support the car body in such manner as to permit a minimum side-sway even with the high centers of gravity of conventional railroad freight car bodies.

Another object of the invention is to provide such a bolster which is so mounted and constructed that it can be easily taken down and replaced or repaired.

Another purpose of the invention is to provide a bolster for a spring suspension in which auxiliary devices for the control of side-sway are rendered unnecessary.

Another aim is to provide such a bolster which will function properly under extreme climatic conditions and which will adequately resist the effects of the corrosion, ice, grit and dirt jamming encountered in extreme railroad operating conditions.

A further object of the invention is to provide such a bolster construction in which the desired spring deflection is obtained with comparatively small movement of the bolster and which is extremely compact and will stand up under conditions of severe and constant use with little servicing.

Another object of the invention is to provide such a suspension in which any desired ride characteristics can be obtained, this being achieved by the use of both leaf springs and helical springs in the bolster spring assembly.

A further object of the invention is to provide a bolster construction having the desired spring friction characteristics, especially when traveling under light load conditions, this being obtained by rendering the leaf springs effective under light load conditions and rendering the helical springs effective under heavy load conditions.

Another object of the invention is to so house the leaf springs as to render them free from the danger of dirt or ice jamming.

Other objects and advantages will be readily apparent from the following description and accompanying drawings, wherein:

Fig. 1 is a fragmentary top plan view of a truck for a railroad freight car body embodying my invention.

Fig. 2 is a vertical longitudinal section, taken generally on line 2—2, Fig. 1.

Fig. 3 is a fragmentary horizontal section, taken on line 3—3, Fig. 2 and showing parts broken away.

Fig. 4 is a fragmentary vertical transverse section, taken on line 4—4, Fig. 3 and showing parts broken away.

The invention is shown as embodied in a bolster construction for a four wheel truck particularly designed for freight car service, although it will be understood that features of the invention can be employed in conjunction with six wheel trucks and can be employed in trucks designed for passenger car service. The flanged railroad wheels 20 are shown as riding upon the rails 21 of

the railroad track and as being fast to axles 22 of standard construction. The ends of the axles project beyond the wheels 20 and are journaled in journal boxes 23 of any usual and well known construction, each of these journal boxes supporting a corresponding pedestal leg of each truck side frame. These truck side frames, indicated generally at 25, are shown as made of a single steel casting, although it will be understood that they could be of fabricated construction and each is formed to provide an upper bar 26, a lower bar 27 and a pair of bolster guide columns 28 which form a bolster opening 29 through the center of each truck side frame. Each of these bolster guide columns 28 is provided with an inwardly projecting vertical flange 30 and the lower ends of these flanges 30 are connected by a horizontal flange 31, the flanges 30 and 31 thereby forming an inwardly projecting saddle or bracket, the interior of which conforms to the shape of the bolster opening 29. Similarly, around the bolster opening, an outwardly projecting saddle or extension is formed in each truck side frame, this comprising a horizontal flange 32 which forms a continuation of the bottom of the bolster opening 29 and side flanges or braces 33 which reinforce and support the horizontal bottom flange 32.

Each of the truck side frames 25 is formed at its ends to provide a pedestal 42 having a pair of pedestal legs 43 which form a pedestal jaw in which the corresponding journal box 23 is secured by a ring spring suspension designated by the numerals 24 and 46 through 61 and described in detail in my said copending applications.

The truck is of semi-rigid construction to permit any wheel to rise without lifting the other wheels from the track, thereby to secure wheel compensation under all conditions of operation. This is obtained by connecting the opposite truck side frames by laminated cross members designated by the numerals 66–72 and described in detail in my said copending applications.

The present invention relates particularly to the bolster construction, the bolster being indicated generally at 75. This bolster is shown as being made of cast steel of box form and square in cross section, the bolster being shown as having a top wall 76, vertical side walls 77, a bottom wall 78, end walls 79 and a horizontal central partition 80 which extends lengthwise through the center of the bolster and divides the bolster into two longitudinal leaf spring compartments 81. At its opposite ends the bolster 75 is provided with an opening 82 in its underside through which the bolster spring connection between the bolster and the truck side frames 25 is obtained, these openings being arranged over the seats provided in the bolster openings 29 by the lower bars 27 and outwardly extending flanges 32 of the truck side frames 25. The top wall 76 of the bolster is formed to provide a center bearing plate 85 which can be of standard form to support the car body (not shown) and the side walls 77 of the bolster have bearing engagement with the opposing faces of the bolster guide columns 28 of the truck side frames, wear plates 86 being preferably secured, as by bolts 87, to these bolster guide columns 28 for this purpose. The bolster 75 can be prevented from moving longitudinally relative to the truck side frames in any suitable manner.

For this purpose one end of the bolster 75 is shown as having integral vertical shoulders or ribs 88 projecting outwardly from its side walls 77 and arranged to engage the inner extremity of the vertical flanges 30 projecting inwardly from the corresponding truck side frame 25 so as to guide this end of the bolster in its vertical movement in the corresponding bolster opening 29. At the opposite end of the bolster a pair of guide plates 89 are bolted or otherwise removably secured to the side walls 77 of the bolster in position to engage the inner vertical extremities of the vertical flanges 30 thereof. By this means it will be seen that the shoulders 88 and removable plates 89 through their engagement with the inner extremities of the vertical flanges 30 of the truck side frames guide the bolster 75 in its vertical movement in the bolster openings 29 and prevent longitudinal movement of the bolster. At the same time, by removal of the guide plates 89 it will be seen that the bolster 25 can easily be removed from the truck, this facilitating both the construction and the maintenance of the railroad truck.

Arranged in each of the leaf spring compartments 81 is a leaf spring 95 which extends the full length of the chamber and is composed of a plurality of leaves 95a of progressively increasing length. These leaves are short at the center of the leaf spring and the lower leaves are of progressively increasing length, each of the springs 95 being secured at its center to the center of the top wall 76 of the bolster by U-bolts 96 or in any other suitable manner. The opposite ends of each leaf spring are arranged above the openings 82 at the ends of the bolster and are capable of being flexed upwardly until they engage the top wall 76 at the ends of the bolster. The opposite ends of the lowermost leaf 95a of the leaf spring is provided with a ridge or corrugation 98 which extends transversely of the leaf and projects downwardly therefrom. This ridge or corrugation 98 fits into a corresponding recess provided in a follower plate 99 arranged in each end of the bolster. As best shown in Fig. 2, a single follower plate 99 supports the companion ends of both of the leaf springs 95 and the underside of each of these follower plates 99 is recessed and provided with a liner 100 against which the upper ends of a plurality of helical bolster springs 101 seat. These helical bolster springs 101 are shown as being four in number at each end of the bolster and the lower ends thereof are shown as seating upon a sheet metal plate 102 which in turn is seated upon the lower bar 27 and outwardly extending flange 32 of the truck side frame within and immediately outside of the bolster opening 29.

The laminated cross members of the truck are preferably assisted in holding the truck side frames against toeing in or toeing out by universally connected cross rods which also serve to support the brake shoes. This structure is designated by the numerals 105–129 and is described in detail in my said copending applications.

The present invention relates essentially to the bolster construction as including the leaf springs 95 housed within the bolster and secured at its center thereto immediately below the center bearing plate, the ends of these springs being arranged in the ends of the bolster so as to be capable of being flexed upwardly and being supported on helical bolster springs which are seated on the truck side frames 25 of the truck at the bottom of the bolster openings 29 therein. The leaf springs are primarily designed to provide the desired resilience under empty car or light load conditions. Under these conditions the ends of the leaf springs 95 are free to flex and provide the

necessary resilient resistance to safely support the light or empty car when traveling at high speeds. When the load upon the car is heavy enough to cause these leaf springs to "bottom" or engage the top wall 76 of the bolster, the resilient resistance is thereafter provided by the multiplicity of helical bolster springs 101. The leaf springs have a degree of spring friction which is desirable under empty car or light load riding conditions, this friction not being present under heavy load conditions when the resilience is provided by the bolster springs 101. However, it will be appreciated that the relative resistance of the leaf and helical bolster springs can be adjusted to obtain any desired result and spring curve.

It will further be seen that the use of the leaf springs 95 permits the bolster 75 to be of much lighter construction than conventional bolsters. Thus, the weight supported by the leaf springs is transmitted directly to the center of the bolster 75 and directly under the center bearing plate 85 by the leaf springs themselves and hence a substantial part of the weight added by incorporating the leaf springs 95 can be removed from the bolster 75. Further, it will be seen that the leaf springs 95 are effectively housed within the bolster so that they are not liable to become inoperative due to ice or dirt jamming, this being the principal objection to the use of leaf springs in railroad car suspensions.

From the foregoing it will be seen that the present invention provides a bolster construction in which the desired riding characteristics can be obtained under both light and heavy load conditions and in which the resilience is in part obtained by the use of leaf springs which are adequately housed within the bolsters and serve to transmit the load directly from the center bearing plate to the truck side frames of the truck. It will further be seen that the construction of this bolster in the spring suspension as shown provides adequate spring movement well within the limits imposed by present day standards.

I claim as my invention:

1. A bolster construction for a railroad truck having truck side frames supported by railroad wheels, and having bolster openings therein, comprising a bolster guided at its ends in said bolster openings and being of box form and having a top wall, vertical side walls, a bottom wall and vertical end walls to provide a substantially enclosed structure except for an opening provided through the bottom wall at each extremity of the bolster, said top wall being formed at its center to provide a center bearing plate, a horizontal multiple leaved leaf spring housed within said bolster and having a thick central portion arranged under said center bearing plate and having horizontal leaves of progressively longer length from the top to the bottom thereof, at least two bolts securing said thick central portion of said spring directly to said center bearing plate, the ends of the lowermost leaves being arranged above said openings in said bolster and being normally free to move upwardly, a helical compression bolster spring seated on each truck side frame within the bolster opening therein and having their upper ends at all times projecting through said openings in said bolster into the interior thereof, and means for operatively supporting said ends of said leaf spring on said helical bolster springs.

2. A bolster construction for a railroad truck having truck side frames supported by railroad wheels, and having bolster openings therein, comprising a bolster guided at its ends in said bolster openings and being of box form and having a top wall, vertical side walls, a bottom wall and vertical end walls to provide a substantially enclosed structure except for openings provided through the lower parts of its opposite extremities, said bolster also having a vertical central partition extending downwardly from said top wall and parallel with the side walls and extending the full length of said bolster thereby to form longitudinal leaf spring compartments on opposite sides of said bolster, said top wall being formed at its center to provide a center bearing plate, a horizontal multiple leaved leaf spring housed within each of said compartments and each having a thick central portion secured to the top wall of said bolster under said center bearing plate and having horizontal leaves of progressively longer length from the top to the bottom thereof, the ends of the lowermost leaves being arranged above said openings in said bolster and being normally free to move upwardly, helical compression bolster springs seated on each truck side frame within the bolster opening therein and having their upper ends at all times projecting through said openings in said bolster into the interior thereof, and means for operatively supporting said ends of said leaf springs on said helical bolster springs.

3. A bolster construction for a railroad truck having truck side frames supported by railroad wheels, and having bolster openings therein, comprising a bolster guided at its ends in said bolster openings and being of box form and having a top wall, vertical side walls and a vertical central partition extending downwardly from said top wall and parallel with the side walls and extending the full length of said bolster thereby to form longitudinal leaf spring compartments on opposite sides of said bolster, said top wall being formed at its center to provide a center bearing plate, a horizontal multiple leaved leaf spring housed within each of said compartments and each having a thick central portion arranged under said center bearing plate and having horizontal leaves of progressively longer length from the top to the bottom thereof, at least two bolts securing said thick central portion of said spring directly to said center bearing plate, the ends of the lowermost leaves being arranged in said bolster openings and being normally free to move upwardly, helical compression bolster springs seated on each truck side frame within the bolster opening therein and having their upper ends arranged within said bolster, and means for operatively supporting said ends of said leaf springs on said helical bolster springs.

ALBERT F. HICKMAN.