No. 761,353. PATENTED MAY 31, 1904.

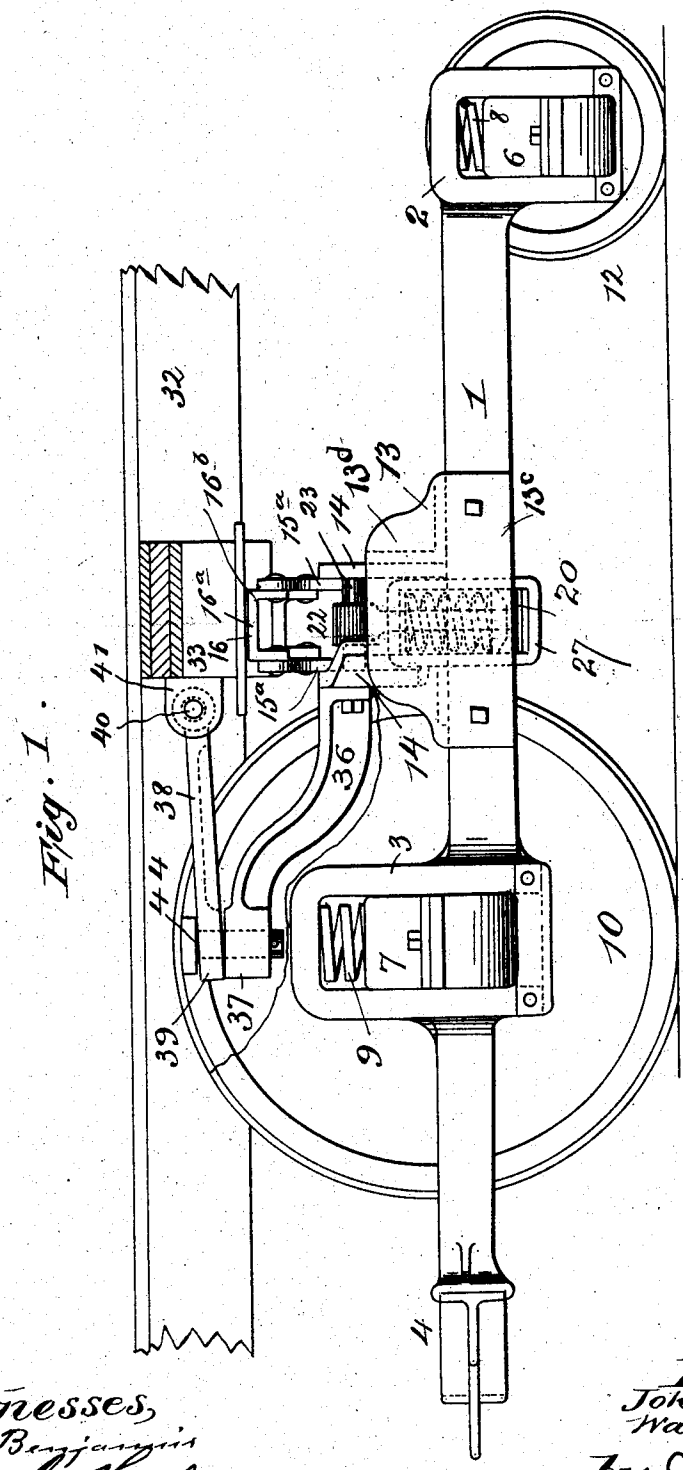
J. A. BRILL & W. S. ADAMS.

CAR TRUCK.

APPLICATION FILED MAR. 22, 1900. RENEWED JAN. 26, 1904.

NO MODEL. 5 SHEETS—SHEET 1.

Fig. 1.



Witnesses,
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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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NO MODEL. 5 SHEETS—SHEET 2.

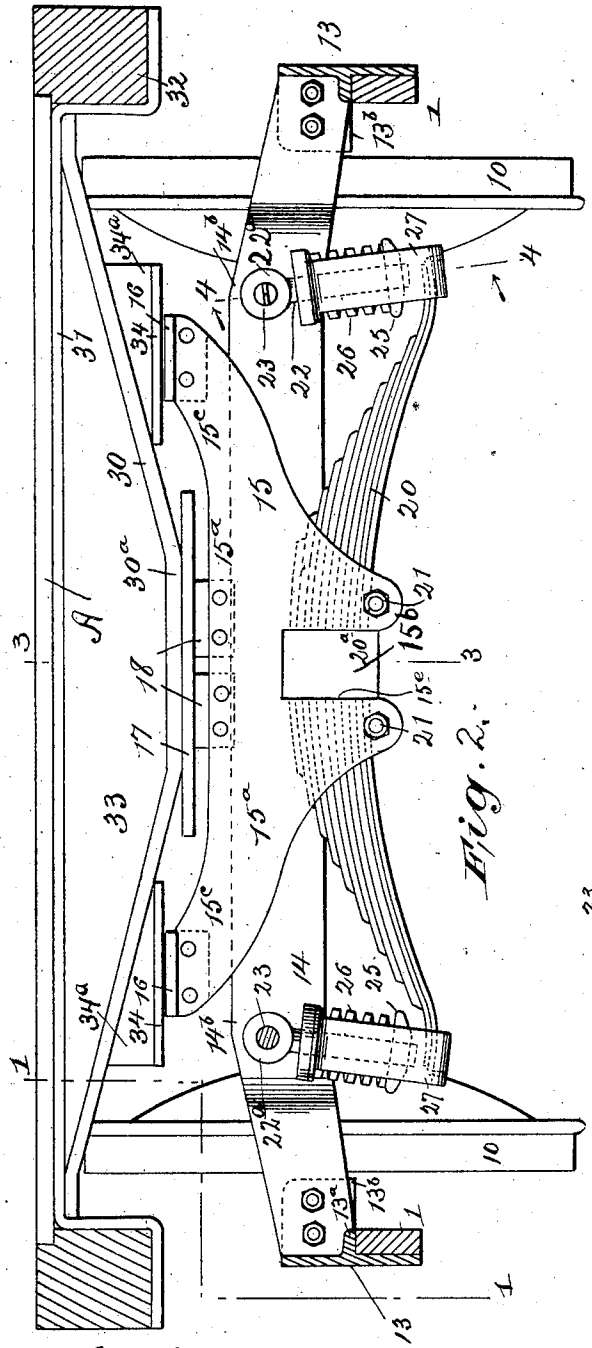


Fig. 2.

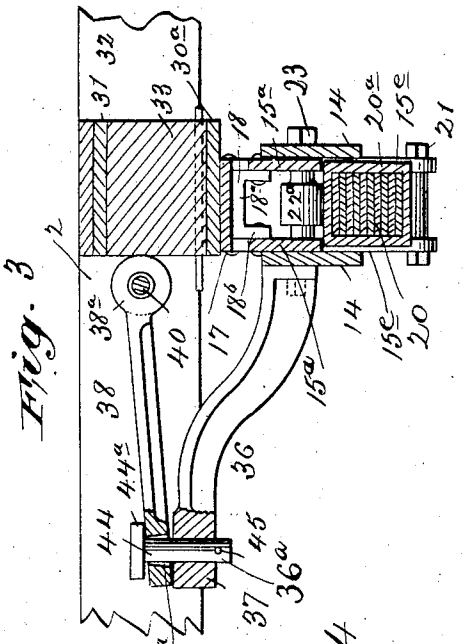


Fig. 3

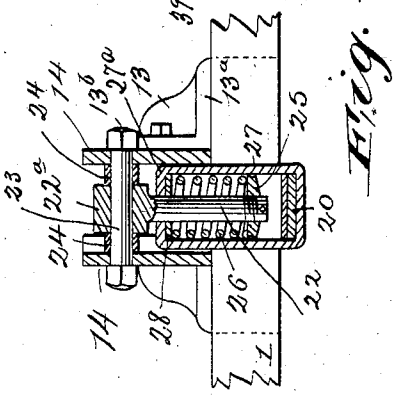


Fig. 4

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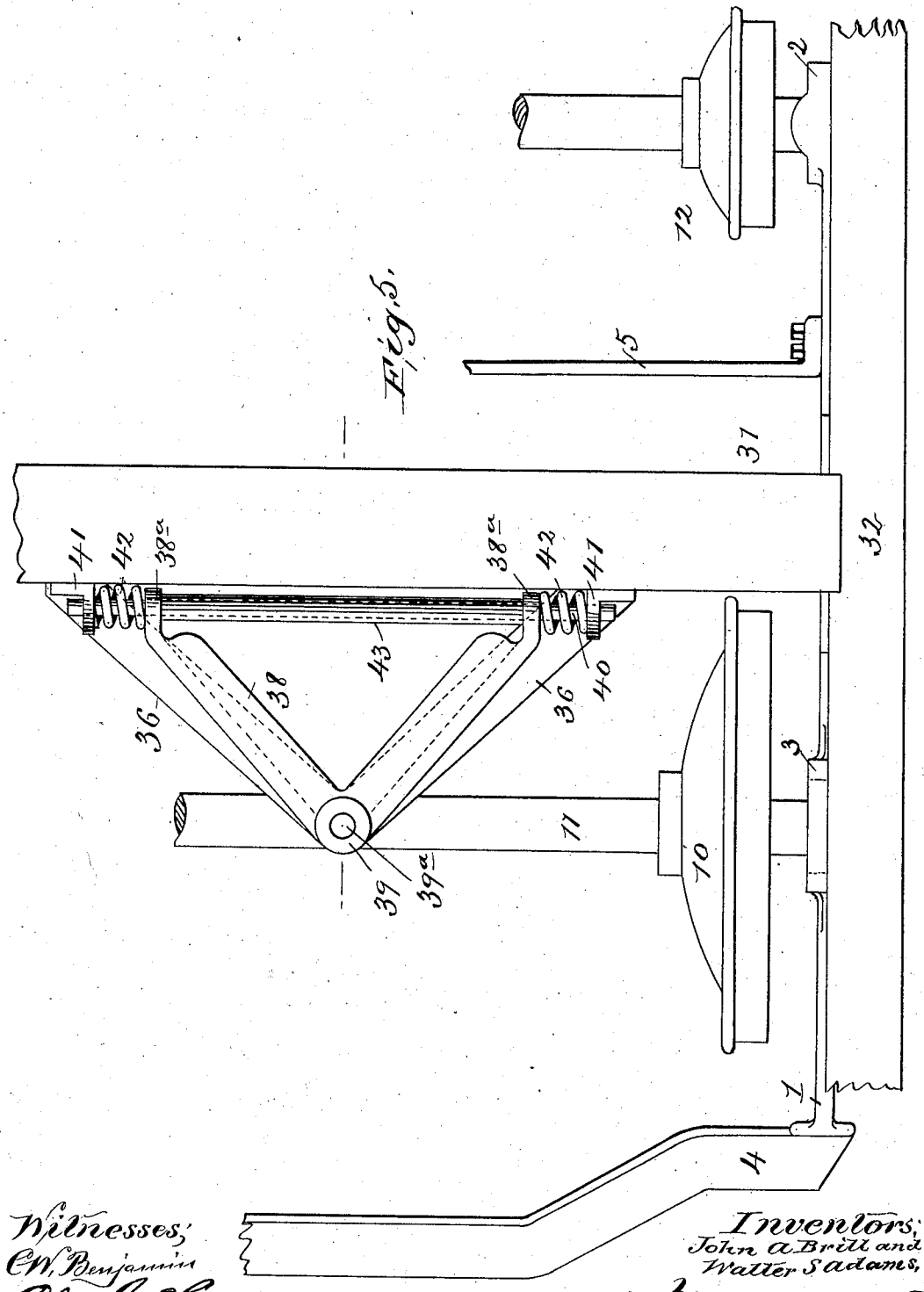
J. A. BRILL & W. S. ADAMS.

CAR TRUCK.

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NO MODEL. 5 SHEETS—SHEET 3.

Fig. 5.



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NO MODEL. 5 SHEETS—SHEET 4.

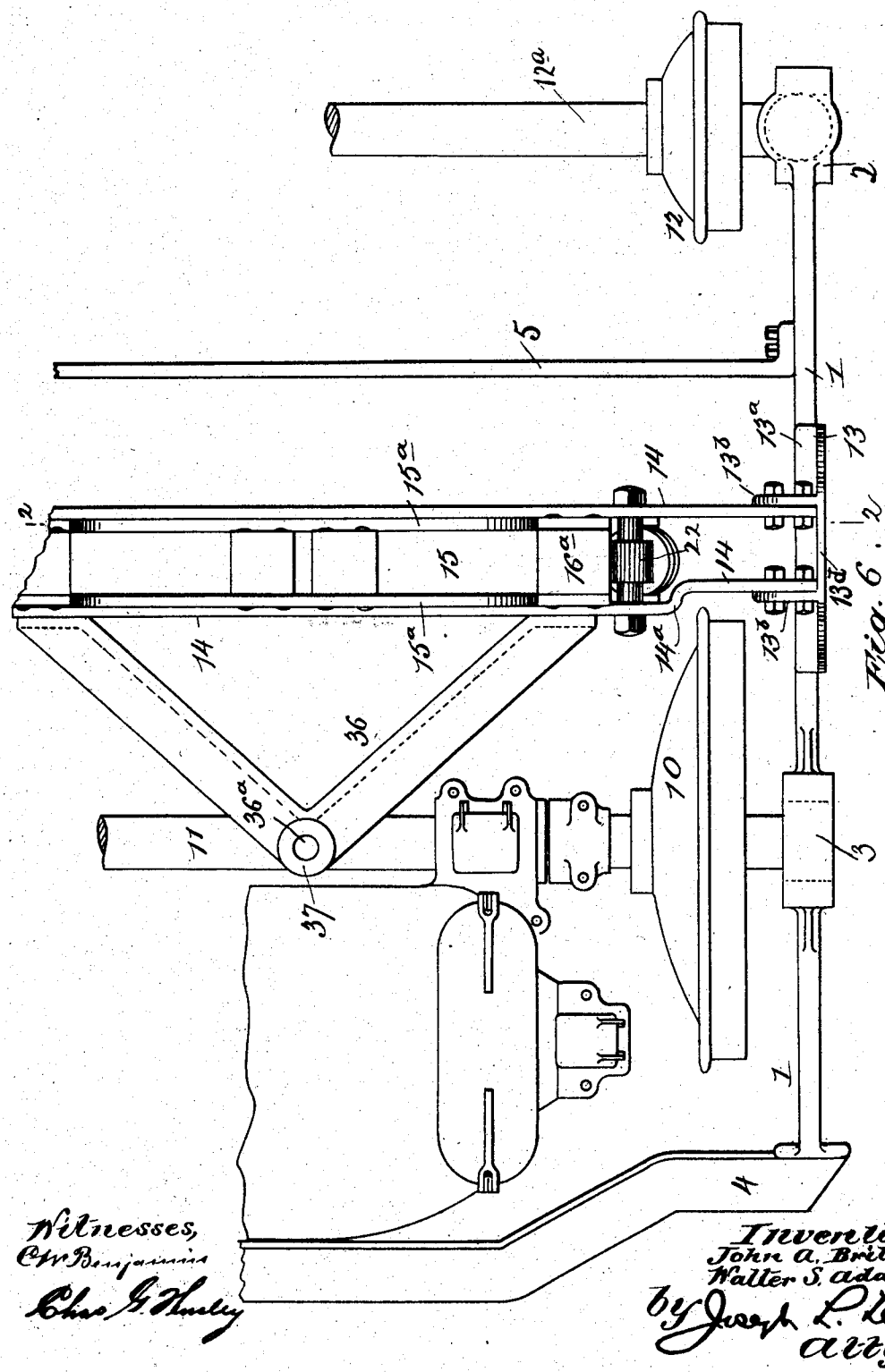


Fig. 6.

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No. 761,353. PATENTED MAY 31, 1904.

J. A. BRILL & W. S. ADAMS.

CAR TRUCK.

APPLICATION FILED MAR. 22, 1900. RENEWED JAN. 26, 1904.

NO MODEL. 5 SHEETS—SHEET 5.

Fig. 9.

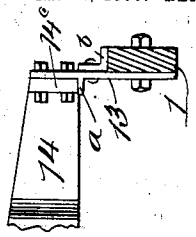


Fig. 7.

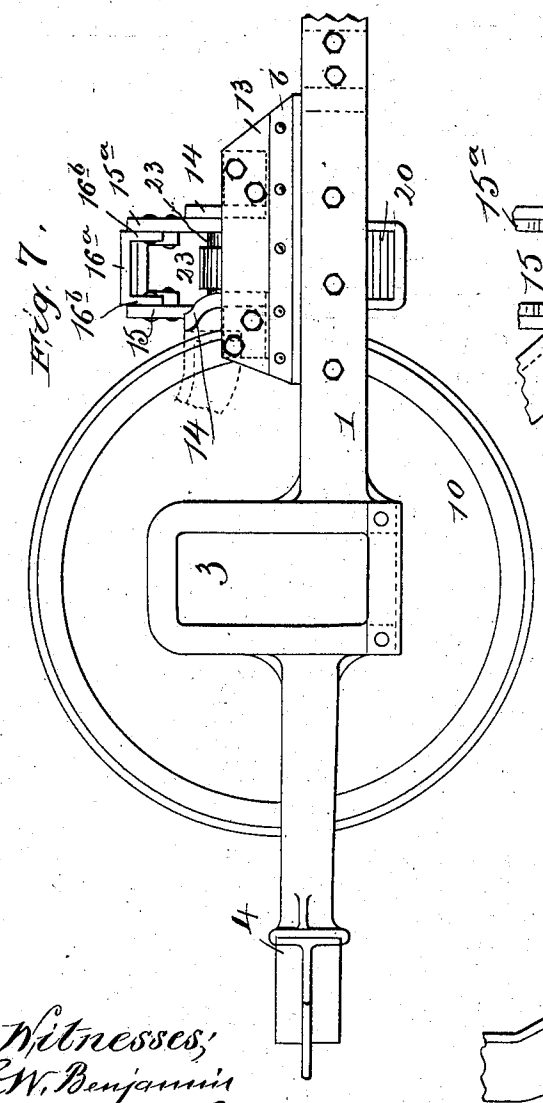
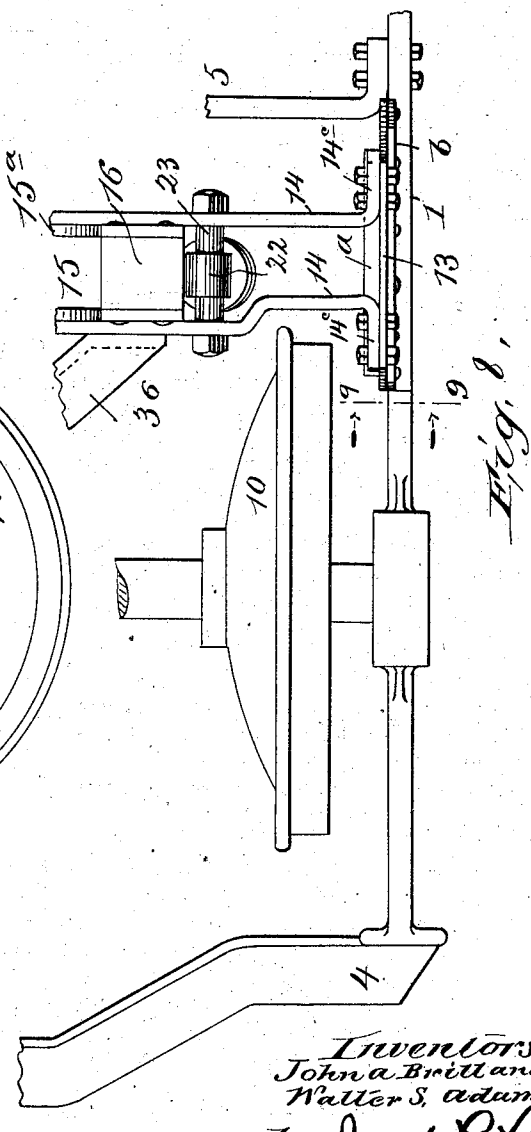


Fig. 8.



Witnesses,
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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 761,353. Patented May 31, 1904.

UNITED STATES PATENT OFFICE.

JOHN A. BRILL AND WALTER S. ADAMS, OF PHILADELPHIA, PENNSYLVANIA; SAID ADAMS ASSIGNOR TO SAID BRILL.

CAR-TRUCK.

SPECIFICATION forming part of Letters Patent No. 761,353, dated May 31, 1904.

Application filed March 22, 1900. Renewed January 26, 1904. Serial No. 190,743. (No model.)

To all whom it may concern:

Be it known that we, JOHN A. BRILL and WALTER S. ADAMS, citizens of the United States, and residents of the city and county of Philadelphia, State of Pennsylvania, (and whose post-office address is care of J. G. Brill Co., of the same place,) have made certain new and useful Improvements in Car-Trucks, of which the following is a specification.

Our invention relates generally to the type of pivotal car-truck known as the "maximum-traction" truck, in which large driving-wheels, smaller trailing wheels, an eccentrically-located pivotal connection, and a motor connected to the driving-wheels, with its weight placed largely thereon, are employed; and it is the object of our invention to produce a cross-bolster truck of this type wherein the weight of the superposed car is taken on the truck between the axles, having many features of advantage to be hereinafter pointed out, and wherein the drawing devices are disposed so as to extend between the truck-bolster or its transoms and the car or body bolster, while the eccentricity of the pivotal center located at the desired point is maintained.

Our invention further embraces many details of improvement in truck construction and in the combination of parts hereinafter described, and further pointed out in the claims.

Reference is to be had to the accompanying drawings, forming part hereof, wherein—

Figure 1 is a side elevation, partly broken and partly in section, substantially on the line 1 1 in Fig. 2, of a portion of a car-body and a car-truck embodying our invention. Fig. 2 is a transverse section substantially on the line 2 2 in Fig. 6. Fig. 3 is a detail section on the plane of the line 3 3 in Fig. 2. Fig. 4 is a detail section on the plane of the line 4 4, Fig. 2. Fig. 5 is a detail plan view of a portion of the truck and the car-body, showing the drawing connection between said parts. Fig. 6 is a similar view, the car-body being removed, a portion of a motor being shown in position. Fig. 7 is a detail side view of the truck, showing a modification in the manner of connecting the transom with the side bars. Fig. 8 is a plan view thereof, and Fig. 9 is a detail section on the line 9 9 of Fig. 8.

In the accompanying drawings similar characters of reference indicate corresponding parts in the several views.

The following is a description of an embodiment of our invention.

The truck-frame we have shown comprises side bars 1, yokes 2 3 in different horizontal planes, and cross-bars 4 5 6 7 are axle-boxes located in the yokes 2 3, and springs 8 9 interposed between the yokes and the boxes resiliently support the frame upon said boxes. At 10 are the driving-wheels, connected by axle 11 in the boxes 7, and at 12 are the smaller or trailing wheels, connected by the axle 12^a in the boxes 6, all of which parts may be of ordinary or suitable construction. Thus it will be seen that the truck we have thus far shown is of the maximum-traction type, in which the greater weight of the car is intended to be borne by the wheels 10, and it will be understood that the form of truck we have illustrated is merely illustrative of a truck to which our improvements may be applied, although the same is operative.

Upon each bar 1 at a point between the yokes 2 3 and preferably as near the yokes 3 as they can be conveniently placed are located transom-supports 13, which in the preferred form comprise vertically-disposed plates, each being in one piece, preferably, and having a horizontally-disposed web 13^a, that rests upon the side bar 1, so that the lower portion 13^c of plate 13 lies against the outer face of the side bar 1. The upper part 13^d rises above the same, and at the portion 13^d above the side bar 1 the plate 13 is provided with inwardly-extending and vertically-disposed lugs 13^b. (See Figs. 2 and 6.)

These transom supports or plates 13 may be secured to the side bars 1 by bolts and nuts or in other suitable manner.

The bolster-transoms of the truck (which is also referred to herein as a "cross member" and which may also be included in the "car-body" or "weight" supporting means, where those words are broadly employed herein) is

secured to these supports 13 and is shown composed of two parallel metallic beams or plates 14, placed on edge, extending crosswise of the truck and secured at the ends to the lugs 13^b of the transom-supports 13, as by nuts and bolts, the ends of the transoms resting upon the side bars 1 and abutting against the supports 13, whereby the truck-frame is strongly braced between the wheels.

In order to bring the transoms 14 well forward toward the driving-wheels 10, while at the same time allowing proper space between them and clearance between the forward transom and the adjacent wheels 10, said forward transom is bent or turned in at 14^a at a point within the line of wheels 10 and at a sufficient distance from said wheels to permit the latter to have lateral movement relatively to the truck-frame. At their central portion the transoms are shown raised above the side bars 1, and for this purpose the transoms are made angular near their ends—that is to say, their out ends extend downwardly from a point 14^b. (See Fig. 2.)

The truck or body supporting bolster 15 is resiliently supported from the transoms 14 and carries center and side bearings for the car-body.

The bolster we have shown consists of two parallel and vertically-disposed plates or webs 15^a, which are substantially triangular in shape, or broad (as to longitudinal expanse) on top and narrow on the bottom, placed at such distance apart as to lie between the transoms 14, so as to play vertically therebetween and in close contact therewith, Fig. 3. The parts 15^a may be cast integral, if desired, or otherwise joined together. The general outline of the bolster 15 which we prefer is shown in Fig. 2, and it has two upwardly-projecting portions 15^c at its ends that are above the center portion 15^d, to which ends side bearings 16 are attached. These bearings are shown provided with a horizontal rubbing portion 16^a and depending webs 16^b, shown located between the plates 15^a of the bolster and attached thereto, as by bolts or the like. (See Fig. 1.)

At the central portion of the bolster is a center bearing comprising in this special instance two plates 18, which are shown made similar to the bearings 16—that is to say, they have a central horizontal portion 18^a and depending webs 18^b, that pass between and are attached to the plates 15^a of the bolster. These plates 16 and 18 serve to brace the plates 15^a of the bolster laterally as well as acting as bearings for the car-body, as hereinafter described. The cross member or transoms together with the bolster may be broadly termed as a "weight" or "body-supporting" means and is intended, of course, when so used to include this means or any other used for the same purpose.

While the side and center plates on the truck and body are in different horizontal places, this does not affect the slight lateral motion relative to each other to which they are subject when the car passes around curves, since they are all horizontal and parallel. One or the other, or both, of the coöperating bearings are made large enough so that this motion will not separate them by causing one to move off the other, as might occur were they made small.

As before stated, the bolster 15 is resiliently supported from the transoms 14, and the devices we have shown for this purpose are as follows: 20 is an upwardly-arched and transversely-disposed semi-elliptic spring having its central portion located between and straddled by the plates 15^a of the bolster 15, the web of said bolster resting upon the top of the strap or band 20^a of said spring, and bolts 21, passing through said plates beneath the spring, serving to retain said plates and spring firmly in position. The strap 20^a of said spring is shown located centrally of the bolster, and it projects into vertical slots 15^e in the plates of said bolster, (see Figs. 2 and 3,) whereby endwise movement of the spring relatively to the bolster is prevented.

The spring 20 at its ends is resiliently supported from the transoms 14, and the means that connect the spring 20 with said transoms are preferably in pivotal connection with said transoms. The specific means we have shown for this purpose consists of two pivotal and extensible spring-links, one at each end of the spring 20, and each link and its means of support comprises a bolt or hanger 22, (shown provided with an apertured and enlarged eye 22^a at its upper end to receive a pivot-pin 23, that is carried by the transoms 14,) and may be in the form of a bolt provided with a head and nut for convenience in holding it in position, the hanger 22 thereby being pivotally supported between the transoms, and suitable washers 24 may be interposed between the head 22^a of the hanger and the transoms to keep the hanger from lateral movement. Near its lower end the hanger 22 has a spring cup or follower 25, which may be connected thereto in a suitable or well-known manner, and 26 is a spring coiled around the hanger 22 and resting upon the cup 25. At 27 is a rectangular strap or housing, the top cross-bar 27^a of which is provided with an aperture through which the hanger 22 passes and guides, and the strap or housing 27 receives within it the cup 25 and spring 26 and rests at its upper cross-bar 27^a upon said spring, a washer 28 preferably being interposed between the cross-bar and the top of said spring. By the foregoing means the strap is resiliently supported from the hanger 22 and adapted to have vertical movement thereon, and the entire link is made extensible and permitted to have a transverse swing to allow of the straightening of the spring 20 or the swing of

the bolster. By preference these links are outwardly splayed to increase the stability of the bolster-support. Beneath the hanger 22 within the strap 27 is a suitable space to receive the end of the spring 20, the spring being attached to said strap or housing, as by bending its end down to enter a slot or groove in the said strap, as shown in dotted lines in Fig. 2.

In Fig. 2 it will be seen that these pivotal and resilient supports for the ends of the spring 20 are so hung that they incline outwardly from a vertical line passing through their pivots, or, in other words, they diverge downwardly and outwardly, the length of spring 20 being sufficient to hold them normally in this position, the effect of which is when the car-body swings to one side, as in passing around a curve, to lift that side, and thus compel gravity to assist in stopping the lateral swinging of the car. Another effect is to lift the ends of the elliptic spring whenever the middle is depressed, thus compensating partially for the downward movement and having less effect upon the body. It will be sufficient at present to say that the weight of the car that comes upon the bolster 15 will be transmitted to the springs 26 and thence through the hangers 22 to the transoms 14, and thus to the truck-frame, and the strength of springs 26 may be such that until the spring 20 has been compressed to a predetermined extent the springs 26 will not settle farther than the initial load and that thereafter the springs 26 will be compressed or settled upon a greater load being applied to spring 20. The relative arrangement of the resistance of the spring, however, may be varied as may be found desirable, the principal feature, however, of this part of our invention being that the spring 20, that supports the bolster, is itself resiliently supported at its ends from the transoms and in such manner that it may have lateral movement to a sufficient extent for properly supporting a car-body on a truck so constituted. In some aspects of our invention the spring-links may be supported at any desired point on the transoms, and certain combinations are claimed with this in view, their exact location not being essential thereto. The location of the links adjacent the wheelgage or beyond the side bearings is preferred on account of the long and stable spring-base for the bolster which is thus secured.

As before illustrated, the car-body A is supported upon the bolster 15 and the weight shown as being supported on the center bearing 18, and it will be understood that any suitable body-bolster may be used above the truck-bolster 15. We have shown a bolster comprising a bent plate 30, having a horizontal portion 30^a above, to which the body-bearing 17 is secured over the center bearing 18 of the truck, a top transverse beam 31, having curved ends connected with the side sills 32 of the car-body, and an interposed wood filling 33. It will be seen that the portion 30^a of the body-bolster is above the center bearing 17 18 and that the car-truck can swivel thereon as well as have lateral movement thereunder.

To resist the rolling motion of the car, we have provided side bearings 34, that overlie the truck side bearings 16, which bearings 34 may be in the form of depending castings 34^a, attached to the body-bolster and having horizontal plates 34, adapted to bear on the plates 16.

We have shown the superposed weight as being carried by the center bearing; but, if preferred, the weight of the car-body may be taken on or distributed over all three bearings on the bolster 15 or upon the side bearings 16 alone—that is, to the exclusion of the center bearings (in which latter event the center bearings may be dispensed with) the peculiar spring-support for the same beneath and at the center allowing and at the same time resisting the rolling and rocking action of the car. It will be noticed that the rocking point or center of oscillation of the body and bolsters is substantially at the connection of the truck-bolster with the semi-elliptic spring, and is thus below the top or upper journals of the spring-links supported upon the truck-transoms, or it may be at some other point in the length of said spring. This connection of the body and truck makes it a very easy riding car, since it is entirely elastic throughout, even in the rocking motion above explained, and consequently throws less strain upon both the body and truck structures, thus prolonging the life of the car. The fact also of locating the points of suspension and rocking points low on the frame lowers also the center of gravity of the car and renders it more stable than the ordinary car whose center of oscillation or rocking points are substantially at the center bearings of car and truck bolsters, and thus above the points of suspension of the upper ends of the supporting-links.

As stated, the truck-bolster is located as near the driving-wheels 10 as possible to increase the traction. As a consequence of the employment of a transversely-extending weight-bearing bolster it (the bolster) is not placed closely adjacent the driving-axle 11 or over it, because it would be necessary to raise the transoms, bolster, &c., to clear the wheels, and therefore raise the car-body entirely too high for practical purposes. Besides, it is necessary to have some of the weight placed upon the truck-frame side of the axle to aid in keeping the small wheels upon the track; but when the bolster, with its ordinary swivel connections, is placed away from the driving-axle the driving-wheels are subject to considerable movement about the pivotal center as an axis when rounding curves. To provide room for this action, it has been usual to either make the car-body wide to allow room

for the wheels to radiate between the sills or to raise the car-body above the wheels, either of which may be and generally is extremely objectionable. In order, therefore, to maintain the low-hung bolster placed inside and near the driving-wheels and at the same time permit the truck to be used with a narrow car and to reduce the variation of the driving-wheels to a minimum, the swiveling or pivotal center (which may be a mechanical or theoretical point) or pivotal connection between the car-body and the truck is located over (or near) the driving-axle and preferably on its longitudinal center, as illustrated in Fig. 6, and connect it with the truck and body by a suitable drawing device, whereby the car-body sills or structure may be placed very close to the sides of the wheels, and the latter may extend up as far as desired to the car bottom or platform construction. This is accomplished by the following arrangement: From the position of transoms 14 shown it will be understood that the weight of the car-body comes on the truck at a point nearer the driving-wheels 10 than the trailing-wheels 12, and it will also be understood from the construction hereinafter described that the truck swivels or pivots beneath the car-body at a point coincident with that of the members 36 and 38, Fig. 5, the center bearings 17 18 and the coöperating side bearings being flat or otherwise formed, as explained, to permit the lateral movement between them at this time.

To the forward transom 14 is attached a bracket or member 36, Figs. 3, 6, which is shown substantially V-shaped, triangular, and upwardly curved and extends forwardly toward the adjacent axle 10 and upwardly to a point in the center longitudinal line of the car, where it is provided with an opening 36^a, preferably formed in an enlargement or head 37, or, in other words, from the head 37 two arms project outwardly, downwardly, and toward the transom 14, the center of the opening 36^a being preferably over the longitudinal axis of the driving-axle 11. This bracket may be secured to the transom in any suitable manner, as by bolts or the like.

To the body-bolster is attached a draw-bar 38, Figs. 3 and 5, which is located above the bracket 36 and is substantially in similar form and provided with a head portion 39, having an aperture 39^a, or, in other words, the draw-bar has two arms projecting outwardly from an apex at 39 in the general direction of the arms of the bracket 36. This draw-bar is substantially and in many aspects a part of the body-bolster, and our invention in its broad aspects would be present if the body-bolster and its bearings were made in one integral or component piece with the draw-bar.

The draw-bar 38 is pivotally connected with the body-bolster and is also so connected therewith that said parts may have lateral movement relatively to each other.

We have shown the ends of the arms of the draw-bar 38 as provided with enlargements 38^a, having apertures that freely receive a pivot pin or bar 40, that is attached to the bolster, as by means of brackets 41, secured to or forming part of the bolster. (See Figs. 1 and 5.) There is a space between each bracket 41 and the adjacent end 38^a of the draw-bar 38, in which space is located a spring 42, that is disposed about the rod 40 and bears at one end against the bracket 41 and at the opposite end against the end 38^a of the draw-bar. (See Fig. 5.) By preference the ends of the draw-bars are braced laterally, and we have shown such a brace as consisting of a tube 43, mounted upon the rod 40 and extending between the ends 38^a of the draw-bar and bearing against the same, whereby the arms of the draw-bar are kept from being pressed toward each other.

It will be understood from the foregoing that the draw-bar 38 is pivoted to the bolster, so as to have vertical play and also can have lateral movement along the rod 40, (or the rod 40 can move through the openings in the arms of the draw-bar and the tube,) and the springs 42 tend to keep the draw-bar centered relatively to the bolster. The draw-bar is pivotally connected with the bracket 36, and for this purpose the opening 36^a in said bracket and opening 39^a in the draw-bar are alined (see Fig. 3) and receive a drawing-pin 44, which is shown provided with an enlarged head 44^a, and a pin or the like 45 beneath the bracket 36 serves to retain the same in position.

It will be seen from Figs. 1 and 3 that the draw-bar 38 rests at its free end upon the bracket 36, and to allow for the vertical movements of the truck and car-body relatively to each other at the draw-pin 44 the opening 39^a of the draw-bar is made sufficiently large to enable the draw-bar to have free movement within certain limits upon the pin 44. (See Fig. 3.) From the foregoing it will be understood that as the truck is driven it will communicate motion to the car-body through the medium of the bracket 36, pin 44, and draw-bar 38. It will be seen also that the pivotal point of the car on the truck is at the pin 44, or, in other words, is between the union of the bracket 36 and the draw-bar 38—that is, at the draw-pin 44—and that this point may be located either within or outside of the wheel-base; but it is preferably located, as shown in Figs. 1 and 5, in line with the center of axle 11 and on the central longitudinal axis of the truck. It will be understood, therefore, that as the truck swivels beneath the car-body, as in rounding a curve in the track, if any lateral strain is placed upon the draw-bar the body-bolster may move laterally independently relatively to said draw-bar, and the spring 42 will allow such movement, and when the truck straightens again beneath the car-body said spring will move

the draw-bar back to its normal position. Ordinarily the truck and body-bolster bearings would slide laterally relatively to each other at such times; but the springs 42 provide a yielding connection the better to accomplish this action and to guard against injury from sudden jars or strains. It will be apparent that these parts constituting the swivel connection between the truck and body-bolster or car may be varied largely, yet all tending to the same end—viz., that of swiveling over or near the driving-axle—and while the above has been described with reference to the details of construction the invention is not to be limited thereto, for we are the first to provide an outside swivel connection for the purposes described or for accomplishing the results sought, and hold all such changes, alterations, and modifications to be within the spirit thereof and which we intend to broadly claim.

In the modification shown in Figs. 7, 8, and 9 the transom-support 13 is composed of a plate having an inwardly-projecting web or ledge *a*, upon which the ends of the transoms 14 rest, the plate 13 being bolted along the inner face of the side bar 1 of the truck, and as an additional support for said plate upon the side bar an angle piece or L-shaped bar *b* is riveted or otherwise attached to the outer face of plate 13 and rests upon the side bar 1, as clearly shown in Fig. 9. This part *b* thereby assists in sustaining the weight of plate 13 and its superposed parts upon the side bar 1. The free ends of the bar 14 of the transom are shown bent sidewise at 14ᵉ and bolted to the plate 13 and resting upon the ledge *a*.

We do not limit our invention to the specific details of construction herein shown and described, nor as to certain features to their described combination, as they may be varied without departing from the spirit thereof.

We claim—

1. A truck of the maximum-traction type having large and small wheels, and a frame, combined with a transversely-disposed bolster and transoms located nearer the large than the small wheels, and means for establishing a pivotal connection between the truck and car over or adjacent the axle of the large wheels comprising an element extending from said transom toward the said axle and a further element pivotally connected with the first named and adapted to be connected with said car.

2. In a car-truck, the combination with the frame and the transversely-disposed upwardly-arched semi-elliptic spring, the bolster superposed upon the central portion of the spring, and transversely-swinging links supported from the truck-frame and suspending the ends of the said spring.

3. In a car-truck, the combination with the frame and the transversely-disposed upwardly-arched semi-elliptic spring, the bolster superposed upon the central portion of the spring, and transversely-swinging extensible links having interposed springs to resist such extension supported from the truck-frame and suspending the ends of the said semi-elliptic spring.

4. In a car-truck, the combination with the frame and the transversely-disposed upwardly-arched semi-elliptic spring, the transverse bolster of less longitudinal extension than the said spring, superposed upon the central portion of the spring, and transversely-swinging extensible links having interposed springs to resist such extension supported from the truck-frame and suspending the ends of said semi-elliptic spring.

5. In a car-truck, the combination with the truck-frame having a cross member, of a body-supporting bolster on a spring forming a seat for said bolster, other springs on said cross member, and movable connections between these springs and the first-named springs.

6. In a truck, the combination with a truck-frame, of a bolster combined with a cross member of said frame for lateral movement, a spring upon which the said bolster rests, rods or bolts extending from said cross member, and movable connections between the said spring and the said rods or bolts.

7. In a car-truck, the combination with a truck-frame, a bolster movably combined with a cross member of said frame, a semi-elliptic spring suspended from the said cross member and upon the central portion of which the bolster bears, the links extending through said cross member and connected with said semi-elliptic spring, and springs combined with said links for supporting said semi-elliptic springs.

8. In a car-truck, the combination with the frame having a cross member, a bolster combined with said member, a semi-elliptic spring below the cross member and supporting the bolster at its central portion, coil-springs upon said cross member on each side of the bolster, and links for supporting the semi-elliptic spring having a compressing engagement with the upper ends of said coil-springs.

9. In a car-truck, the frame having a cross member, sustaining a plurality of spring-holders, of a bolster combined with the said member, a semi-elliptic spring below the said member and engaged at its central portion by the pendent portion of said bolster, the coil-springs seated in the holders, the rods or bolts having caps engaging said coil-springs and extending through the cross member, and link connections between the lower ends of said rods or bolts and the ends of the semi-elliptic spring.

10. In a car-truck, the combination with a truck-frame, of a short body-supporting bolster and truck center bearing, swing-links, a spring connecting said links to said center bearing intermediate the side members of the

frame, and other springs connecting the links to said frame.

11. In a car-truck, the combination with a truck-frame, of a body-supporting swing-bolster spring-seated on a cross member of said frame by a semi-elliptic spring, and swing-links with interposed coil-springs.

12. In a car-truck, the combination with the truck-frame, of a body-supporting bolster, and means for supporting the same comprising the semi-elliptic spring suspended transversely within the truck-frame by extensible and swinging links having interposed coil-springs.

13. In a car, the combination with a truck-frame, having a cross member, of a body-supporting bolster, and means for supporting the same within the said cross member comprising the semi-elliptic spring suspended within the cross member by the extensible links with interposed coil-springs, the links being hung to swing transversely of the truck in said cross member.

14. In a car-truck, the combination with the truck-frame, having a spaced cross member, of a body-supporting bolster located within said member, a leaf-spring supporting said bolster, and a set of link-connected and pivotally-supported springs extending through said cross member, and included in the means for suspending the leaf-spring from said cross member.

15. In a car-truck, the combination of a transom and a bolster, a lateral support for the bolster, with means for resiliently suspending said support from said transom.

16. In a car-truck, the combination of a transom, with a bolster, a laterally-disposed spring connected with and supporting said bolster, and means for resiliently supporting said spring secured thereto at its ends and pivotally suspended from said transom.

17. In a car-truck, the combination of a transom with a bolster having a center bearing, a spring connection with said bolster beneath said bearing, and means for resiliently supporting said spring from said transom.

18. In a car-truck, the combination of a transom, with a bolster having a center bearing and side bearings, a spring connected with said bolster beneath said bearings, and means for resiliently supporting said spring upon said transom.

19. In a car-truck, the combination with a transom, of a bolster having side-bearings adjacent its ends, and spring-supporting said bolster from a point between the side bearings, and means for resiliently and pivotally supporting said spring from said transom.

20. In a car-truck, the combination of the transom, with a bolster having side bearings adjacent its ends, a laterally-disposed spring supporting the bolster intermediate of its ends and pivotal and resilient means supporting the ends of the spring from the transom at a point beyond said bearings.

21. In a car-truck, the combination of a transom, with a bolster comprising a pair of substantially parallel plates, a spring secured between said plates and means for supporting said spring from said transom.

22. In a car-truck, a transom comprising two substantially parallel plates or beams having a space between them, with a bolster located between said plates or beams, a spring secured to said bolster, and means for suspending said spring between said plates or beams.

23. In a car-truck, a transom comprising two substantially parallel plates or beams having a space between them, with a bolster located between said plates or beams, a spring secured to said bolster, and springs connected with and supported from said transom and also connected with the first-mentioned spring.

24. In a car-truck, the combination of a transom with a bolster, a semi-elliptic spring secured thereto, and springs attached to said transom and connected with said semi-elliptic spring to support the same.

25. In a car-truck, the combination of a transom with a bolster, a semi-elliptic spring connected therewith, a pair of springs pivotally supported by said transom so as to have a lateral movement, and means for connecting said springs with the first-mentioned spring.

26. In a car-truck, the combination of a transom with a bolster, a semi-elliptic spring connected therewith, a pair of springs suspended from the transom, and means for connecting the ends of the first-mentioned spring with the second-mentioned springs so that the weight transmitted by the first-mentioned spring will act to compress the second-mentioned springs.

27. In a car-truck, the combination of a transom with a bolster, a spring connected therewith, a pair of springs, supports for said springs attached to the transom and upon which said springs rest, and connections between the upper ends of said springs and the ends of the first-mentioned spring for supporting the latter on the former.

28. The combination in a car-truck of the transom, with a bolster, a spring secured thereto, a pair of spring-supports attached to said transom, spring-cups carried by said supports, springs resting upon said cups, and straps or housings connecting said springs with the free ends of the first-mentioned spring.

29. In a car-truck, the combination of a transom extending between the side frames, with a lateral bolster, a laterally-disposed leaf-spring secured thereto, a pair of spring-supports hung from the transom, and straps or housings connecting said springs with the free ends of the first-mentioned spring.

30. In a car-truck, the combination of a transom with a bolster, a spring connected with said bolster, a pair of spring-supports hung upon bars or bolts carried by said transom and depending therefrom, spring-cups carried by said supports, springs upon said spring-cups, and straps having apertures to receive said supports whereby they are guided and embrace said springs, the free ends of the first-mentioned spring being attached to said straps or housings.

31. In a car-truck, a transom comprising a pair of substantially parallel plates or beams, combined with a bolster and a semi-elliptic spring secured thereto, both extending between the plates of the transom, spring-supports pivotally connected with and depending from said transom and lying between the plates thereof, springs suspended by said supports, and straps or housings guided by said supports, inclosing said springs, the ends of the first-mentioned spring being supported by said straps.

32. In a car-truck the combination of a transom with a bolster, a spring connected therewith, and a pair of springs pivotally suspended from the transom and suspended so as to normally extend downwardly and outwardly and which are connected to the free ends of the first-mentioned spring.

33. In a car-truck, the combination of a transom, a bolster, the transverse leaf-spring, and means comprising pivotal and spring links for resiliently supporting the leaf-spring from the transom, and a center bearing carried by the bolster, the connection of the bolster and leaf-spring being in line with the center bearing, the side bearings being located between the pivotal support of the links.

34. In a car-truck the combination of a transom with a bolster resiliently supported therefrom, said bolster having its ends raised above its central top portion, a center bearing secured to the central portion below the plane of its ends, and side bearings secured to its ends above the central bearing.

35. A bolster comprising juxtaposed plates spaced apart, bearings extending between and tying the tops of the plates together, and a connection between the lower ends of said plates.

36. A bolster comprising vertically-disposed juxtaposed plates spaced apart, said plates having an intermediate depression and elevated ends, bearings extending between the said elevated ends and tying the plates together at the top, and a connection for the lower edge of said plates.

37. A bolster comprising the vertically-disposed juxtaposed plates spaced apart, having intermediate depressions at the top, elevated ends, and downwardly-extending projections below said depression, bearings secured at the elevated ends and tying the plates together, and a connection extending through the said projections.

38. In a car-truck, a bolster comprising vertically-disposed juxtaposed plates spaced apart, the plates having an intermediate depression, an elevated end at the top, and a downwardly-extending projection, bearings secured in the elevated ends and tying the plates together, and a semi-elliptic leaf-spring secured between the plates at the said projection, and means for supporting the ends of said leaf-spring from the truck-frame.

39. In a car-truck, a bolster having elevated ends and side bearings thereon, a spring beneath the center of said bolster on which it rests, and means for sustaining said spring from the truck-frame.

40. In a car-truck, a truck-frame, combined with a bolster having elevated ends and side bearings thereon, a spring supporting said bolster at its center, and swing-links supporting the said spring from the truck-frame.

41. In a car-truck, a bolster having elevated ends and side bearings thereon, a semi-elliptic spring supporting at its center the center of the said bolster, and means to flexibly support the ends of the spring from the truck-frame.

42. In a car-truck, a bolster having elevated ends and side bearings thereon, a semi-elliptic spring beneath the center of the bolster and to which it is secured, and swing spring-links secured to the frame and carrying the ends of said elliptic spring.

43. In a car, the combination with the truck-frame and a bolster therefor having side bearings disposed away from its center, and upon which a car-body may rest, of a laterally-disposed leaf-spring providing a support at its center for the bolster, connected at its ends with and pivoted to the truck-frame, and upon either or both of which points the bolster is adapted to rock.

44. In a car, the combination with a truck, a bolster upon which the car-body may rest, of a laterally-disposed center support for the bolster, the support itself being flexibly connected at its ends to the truck-frame to provide for a rocking movement of the bolster upon the center of said support and its ends.

45. In a car-truck, a bolster substantially triangular in form and having side bearings on the top side for a car-body, a spring secured to the apex of the bolster to support it, and means to flexibly support said spring from the truck-frame.

46. In a car-truck, a bolster comprising two plates spaced apart and secured together by interposed pieces, bearings on top of said pieces, a semi-elliptic spring having its leaves located and clamped between said plates and sustaining the same, and means for sustaining the said spring from the frame.

47. In a car-truck, a bolster comprising two vertical plates having bearing-plates secured

to them on top, their lower edge being notched, a semi-elliptic spring located between said plates, the band about the center of said spring fitting in said notches in the plates and means for securing said spring and plates together for supporting the latter.

48. In a car-truck, a bolster, bearing-plates on top of the bolster to carry the weight of the car, and a resilient support for the bolster beneath and at the center of the bolster upon which the usual rocking motion is permitted, and pivotal connections between the ends of the support and truck-frame.

49. The combination, with a car-body, of a truck having a frame, a resilient support for the car-body, links suspending the support from the frame, the rocking point or center of oscillation of the body all the support being below the points of suspension of the links upon the frame.

50. The combination with a car-body, of a truck having a frame, a lateral spring-support for the body, swing-links suspending the ends of said support from the transom, and means whereby the center of oscillation of the body upon the support is placed below the points of suspension of the links.

51. The combination, with a car-body, of a truck having a frame, a transom extending across the frame, a support for the car-body comprising a laterally-disposed leaf-spring, links suspending the ends of the spring from the transom, the car-body being carried by said spring at its center and below the points of suspension of the links.

52. The combination with a car-body, of a truck-frame, a bolster on which the car-body rests, a semi-elliptic spring suspended by links from the frame and supporting said bolster at its center, the rocking point of the car-body being substantially at the center of said spring and below the upper ends of the links.

53. In a car-truck, the combination with a truck-frame, of a car-body support flexibly suspended from the frame, the center of oscillation of said support being located below its points of suspension on the frame.

54. In a car-truck, the combination with a truck-frame, of a bolster flexibly suspended from the frame and having its rocking point located below its points of suspension on the frame.

55. In a car-truck, the combination with a frame, of a car-body support suspended from the frame and capable of a transverse oscillation, the center of oscillation of said support being located below its points of suspension on the frame.

56. In a car-truck, a bolster broad on top and narrow at the bottom, bearing-plates located on the top, combined with a spring secured to the narrow part at the bottom, and means for supporting the spring on the truck-frame.

57. In a car-truck, a bolster comprising vertical plates spaced a slight distance apart and secured together by pieces, one of said pieces comprising a horizontal web centrally located, the lower edges of said vertical plates being centrally notched, a semi-elliptic spring located between said plates with its central band fitting snugly in said notches, the said plates bearing on the top of the spring, and bolts extending through said plates beneath the spring at the sides of the notches.

58. In a car-truck, a bolster having side bearings, a semi-elliptic spring supporting said bolster at its center, and means to suspend said spring from the truck-frame, the points of suspension of the said spring being outside of the side bearings.

59. In a car-truck, the combination of a transom with a bolster, a semi-elliptic spring connected therewith, a pair of springs sustained by the transom, and means for connecting the ends of the first-mentioned spring with the second-mentioned springs so that the weight transmitted by the first-mentioned spring will act to compress the second-men tioned springs.

60. The combination in a car-truck, of the side frames, springs suspended from a cross member of said frames, a resilient member transversely suspended by said springs, and a bolster resting on said member.

61. The combination in a car-truck, of the truck-frame, the transversely-disposed semi-elliptic spring movably and resiliently suspended from the frame, and a bolster secured to said spring.

62. The combination in a car-truck, of the truck-frame, spring-links depending from a lateral member of the frame, a semi-elliptic spring, transversely disposed and connecting the links, and means for connecting said elliptic spring with a car-body.

63. The combination in a car-truck, of the side frames supported outside of the wheel-gage, extensible and spring links connected with said frame laterally thereof, a transverse semi-elliptic spring supported by said links, and a bolster on said latter spring.

64. The combination in a car-truck, of the side frames having axle-box pedestals, a semi-elliptic spring lying transversely across said frame, a pivotal spring suspension for the ends of said semi-elliptic spring from the frame of the truck, and a bolster supported on said elliptic spring.

65. In a car-truck, the combination with the side frames having axle-box pedestals, a transom, the bolster, a transversely-disposed resilient support for the bolster, said support being coextensive therewith, and resilient connections between the ends of said support and the transom.

66. In a car-truck, the combination with the side frames, each comprising two pedestals and a beam connecting them, of a car-body-supporting bolster, a single semi-elliptic

spring disposed transversely between the side frames and connected with the center of the bolster, and spring-link appliances connected to the ends of said elliptic spring and flexibly supported at their upper ends on the truck-frame.

67. In a car the combination of a truck having a bolster and a transom, a bracket secured to the transom and extending forwardly to the adjacent axle, with a car-body supported on said bolster, and a draw-bar connected with said car-body and also connected with said bracket.

68. The combination of a truck having a transom, a car-body supported on the transom by an interposed bolster, and a drawing connection between the car-body and the transom comprising two parts pivoted together intermediate of their connection with the car and truck, the pivotal point between said parts being located over one of the axles of the truck.

69. The combination of a car-truck having a transom and a bracket or arm extending therefrom, with a car-body having a bolster supported upon said transom by an interposed truck-bolster, and a drawing connection pivotally connected with the body-bolster so as to have vertical movement relatively thereto and pivotally connected with said bracket or arm to have a horizontal pivotal motion relatively thereto.

70. The combination of a car-truck having a transom with a bracket or arm extending therefrom, with a car-body supported upon the transom by an interposed bolster, a draw-bar pivotally connected with said car-body and to said arm, so that one of said parts can have lateral movement relatively to the other, and a pivotal connection between the draw-bar and said arm.

71. The combination of a truck having a transom and an arm or bracket extending therefrom, with a car-body supported on said transom by an interposed bolster, a draw-bar pivotally connected with said bracket, pivotal means connecting the draw-bar with the car-body so that the parts may have vertical and lateral movement relatively to each other, and means for resiliently opposing the lateral movement of one part relatively to the other.

72. The combination of a car-truck having a transom and a bracket extending therefrom, with a car-body supported upon said transom by an interposed bolster, a draw-bar pivotally connected with said bracket and having two arms that are journaled on a supporting-rod carried by the car-body, and springs interposed between the arms of the draw-bar and the supports for the pivotal rod.

73. The combination of a car-truck having a transom and a bracket extending therefrom, with a car-body supported upon said transom, a draw-bar pivotally connected with said bracket and having a pair of arms, a pair of brackets supported by the car-body, a rod carried by said brackets, said draw-bar being supported by said rod and having a space between its ends and the supports for the rod, and springs interposed between said supports and the arms of the draw-bar.

74. The combination of a car-truck having a transom and a bracket extending therefrom, with a car-body supported on said transom, a draw-bar pivotally connected with said bracket and having a pair of arms, a pair of brackets supported by the car-body, a rod carried by said brackets, said draw-bar being supported by said rod and having a space between its ends and the supports for the rod, springs interposed between said supports and the arms of the draw-bar, and means for bracing the arms of the draw-bar laterally.

75. The combination of a car-truck having a transom and a bracket extending therefrom, with a car-body supported upon said transom, a draw-bar pivotally connected with said bracket and having a pair of arms, a pair of brackets supported by the car-body, a rod carried by said brackets, said draw-bar being supported by said rod and having a space between its ends and the supports for the rod, springs interposed between said supports and the arms of the draw-bar, and a tube mounted upon said rod and interposed between the arms of the draw-bar to prevent the same from moving toward each other.

76. In a car, the combination of a truck having wheels, a transverse bolster between the wheels and a car-body, with a draw-bar connecting truck and car, consisting of two parts, one part being connected to the truck within the wheel-base and the other to the body over the bolster and both parts extending outwardly from the car and truck toward the adjacent axle and pivotally connected at their outer ends.

77. In a car, the combination of a truck having an element transversely thereof, and within the wheel-base and a car-body, a draw-bar connecting them and consisting of two parts, one part being connected to said transverse element and the other to the body by a pivotal union, and both parts extending outwardly toward the adjacent axle and pivotally connected at their outer ends.

78. In a car, the combination of a truck and a car-body, a draw-bar connecting them consisting of two parts, one part being connected to the truck and the other by a laterally-movable connection to the car-body, and both parts extending outwardly toward the adjacent axle and pivotally connected at the outer ends.

79. In a car, the combination of a truck and a car-body, a draw-bar connecting them consisting of two parts, one part being connected to the truck and the other to the body by a spring-opposed laterally-movable connection, and both parts extending outwardly toward

the adjacent axle and pivotally connected at their outer ends.

80. In a car, the combination of a truck and car-body, truck and body bolsters, intervening pivotal devices, comprising a two-part draw-bar extending outwardly as to each part from the truck and the body bolster, and pivotally united at their outer ends for horizontal movement.

81. In a car, the combination with the car-body and truck, a truck-bolster and a body-bolster, two-part draw-bar articulated for pivoting between its ends, the said ends being connected one with the body and the other with the truck adjacent the respective bolsters.

82. In a truck, a drawing device consisting of a bar extending from a point adjacent the bolster toward an axle, another bar over the said first bar and extending away from the said axle, and a pivot-bolt passing through apertures in their ends adjacent the axle.

83. In a car, the combination of a truck and a car-body, two bars secured to vertically-alined portions of the car and truck, and pivotally secured together at their outer ends.

84. The combination with the truck having a transom, axles and wheels, a draw-bar comprising a bar affixed to the transom and extending forwardly between the axles, a rearwardly-extending bar adapted to be secured to the car-body, and a pivot-bolt connecting the two bars.

85. In a truck-frame, large and small wheels, axles therefor, a transom extending between the sides of the frame and within the axles, a bolster supported by said transom having means for supporting a car-body thereon, and a draw-bar comprising a bar affixed to the transom, and extending to and over the axle of the larger wheels, a rearwardly-extending bar adapted to be secured to a car-body above the transom, and a pivot-bolt connecting the two bars over the axles of the larger wheels.

86. In a car, the combination of a car-body and a truck, the truck having large and small wheels, a bolster extending transversely of the truck between the wheels and adjacent the larger wheels, and a triangular drawing member secured to the truck-frame adjacent the bolster, another angular drawing member secured to the car-body, and means for pivoting their apices together.

87. In a car, the combination with a car-body and truck, the truck having large driving-wheels and small trailing wheels, and a bolster supported by the truck-frame between the axles and adjacent the larger wheels, of a drawing member secured to the car-body and having converging sides, another member carried by the truck and lying beneath the body member, and means for pivoting said members together at their narrow ends.

88. In a car, the combination with a truck and car-body, of a bar forming a part of a drawing device adapted to be secured to the car-body and extending toward the axle of the truck, another bar secured to the truck adjacent the bolster and lying beneath the former, and means for pivoting said bars together at their extended ends.

89. In a car, the combination with a car-body and a truck having a frame and a transverse weight-supporting means extending transversely between the sides of the frame and within the wheel-base, a drawing member secured thereto and extending toward the near-by axle, another member secured immediately above to the car-body, and pivotal means for connecting said two members at their extended ends for swiveling purposes.

90. The combination of a car-body, the truck-frame, the wheels and axles, a transverse body-supporting means located between the axles and supported on the truck-frame, a swivel member secured to the said supporting means, a swivel member secured to the car-body over the other member, and a swivel-bolt connecting the said swivel members, over one of the axles.

91. The combination of a car-truck having a frame and a transom connected therewith, a spring extending transversely of the truck and movably secured to the transom, a bolster carried by said spring, a car-body above said bolster, and a draw-bar connected with said transom, and with said car-body.

92. The combination of a car-truck having a cross member, a spring extending transversely thereof and adjacent the cross member, and movably supported by the cross member, a bolster supported by said spring; the spring, cross member and bolster constituting car-supporting means, a car-body above said bolster, and a draw-bar connected with the cross member and with the car-body.

93. The combination of a truck having a cross member, a spring extending transversely thereof, and adjacent the cross member, and movably supported by the cross member, a bolster supported by the spring; the spring, cross member and bolster constituting the car-supporting means, and a draw-bar connected with said cross member, and adapted to be secured to a car-body.

94. The combination of a car-truck, of a cross member, an upwardly-arched semi-elliptic spring extending transversely thereof adjacent the cross member, and movably supported by said cross member, a bolster supported intermediate of its ends upon the arch of said spring, and a draw-bar connected with said cross member, and adapted to be secured to a car-body.

95. The combination in a car-truck, of a cross member, an upwardly-arched semi-elliptic spring extending transversely of the truck and movably supported by said cross member, a bolster supported intermediate of its ends upon the arch of said spring, and a draw-bar

secured to said cross member and extending toward one of the truck-axles, and adapted to be secured to a car-body.

96. The combination in a car-truck having large driving-wheels and small trailing wheels, of a truck-frame, a bolster, a transom extending between the side members of the frame, a transversely-extending spring supported by said transom and supporting the bolster, a car-body above said bolster, the transom and spring and bolster being located adjacent the driving-wheels, and a draw-bar connected with said transom and with said car-body.

97. The combination in a car-truck having large driving-wheels and small trailing wheels, a truck-frame, a transversely-extending spring, and a transom and a bolster constituting car-supporting means located eccentrically of the truck-axles, and adjacent the driving-wheels, a car-body, and a draw-bar connected with said transom and with the car-body.

98. The combination in a car-truck having large driving-wheels and small trailing wheels, of a truck-frame, a transom, and upwardly-arched semi-elliptic spring extending transversely of the truck adjacent the transom, and movably supported thereby; the transom, bolster and spring being located nearer the driving than the trailing wheels, and a draw-bar extending from said transom toward the axle of the driving-wheels.

99. The combination in a car-truck having large driving-wheels and small trailing wheels, of a truck-frame, an upwardly-arched semi-elliptic spring extending transversely thereof, and supported by the frame, a bolster supported intermediate of its ends upon the arch of said spring; the spring and its support being located eccentrically of the axles of said wheels and adjacent the driving-wheels, a draw-bar extending from the spring-support toward the axle of the driving-wheels, and means for pivotally securing a car-body to the outer end of said draw-bar.

100. The combination in a truck having large driving-wheels and small trailing wheels, a truck-frame, a cross-bar, a bolster spring-supported from the said cross-bar nearer the driving than the trailing wheels, and a draw-bar extending from said cross-bar toward and adjacent the axle of said driving-wheels.

101. In a car-truck having large driving and small trailing wheels, the combination of a truck-frame, and a bolster spring-supported upon said frame eccentrically of the axles of said wheels and adjacent the driving-wheels, a draw-bar extending from the spring-support toward the axle of the driving-wheels, and means for pivotally securing a car-body to the outer end of said draw-bar.

Signed in the city and county of Philadelphia, State of Pennsylvania, this 27th day of December, 1899.

JOHN A. BRILL.
WALTER S. ADAMS.

Witnesses:
T. H. MEULINGS, Jr.,
WM. J. FERDINAND.