May 15, 1945. R. LEPPLA 2,375,930

CAR TRUCK

Filed May 6, 1943 2 Sheets-Sheet 1

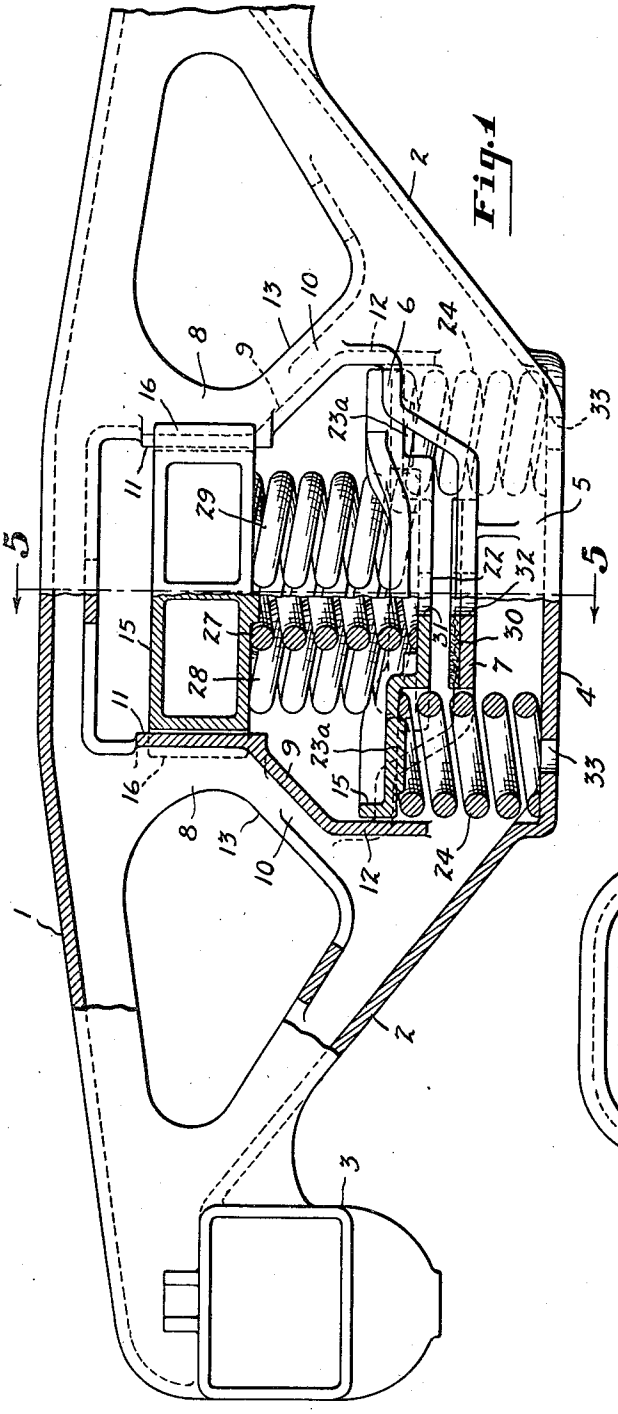


Fig. 1

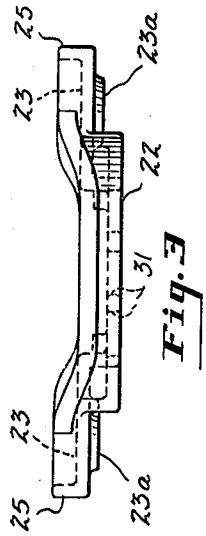


Fig. 3

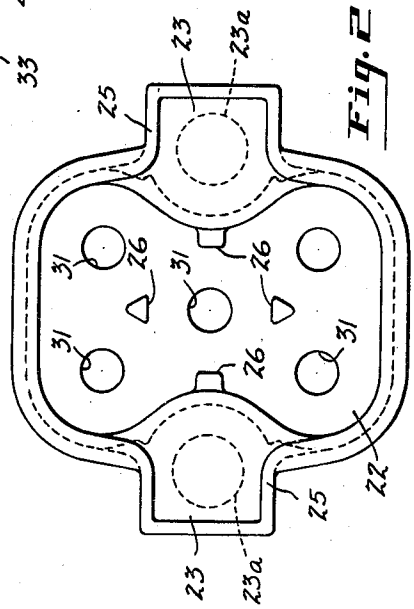


Fig. 2

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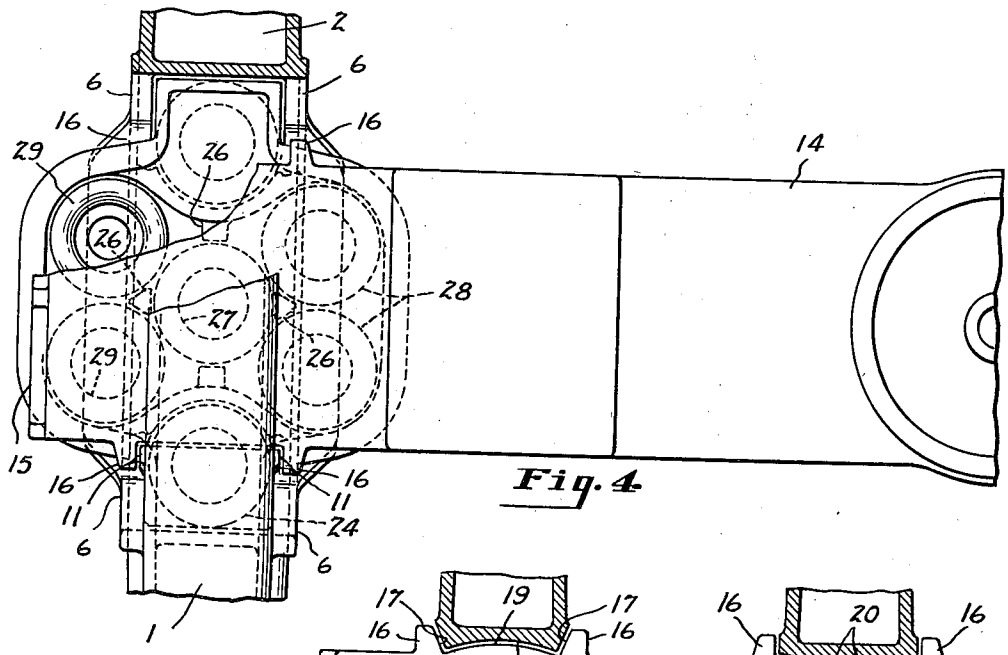


Fig. 4

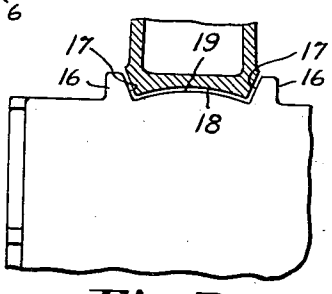


Fig. 6

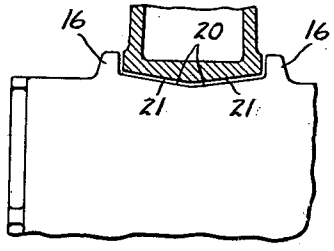


Fig. 7

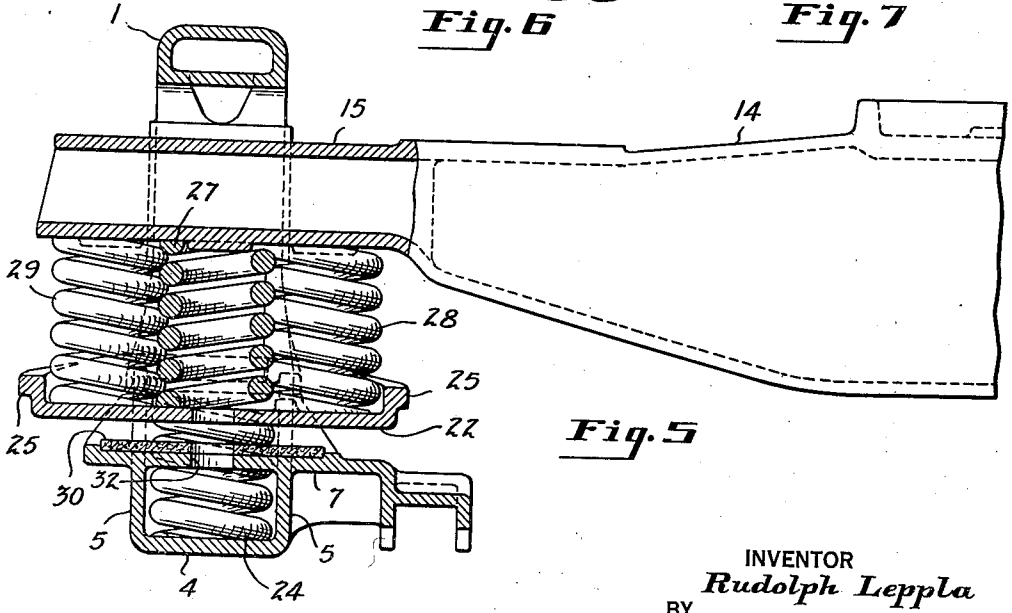


Fig. 5

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2,375,930

CAR TRUCK

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Application May 6, 1943, Serial No. 485,801

10 Claims. (Cl. 105—197)

This invention relates to car trucks of the self-aligning type and particularly to such a truck having differentially acting springs arranged in superposed sets between the bolster and side frames which act in series during a portion of the bolster movement, one of the superposed sets of springs being stopped off upon imposition of a predetermined pressure, as is described and claimed in my Patent No. 2,317,390, granted April 27, 1943.

In car trucks of the self-aligning type, the truck side frames are commonly provided with bolster openings which have upper portions in which the ends of the bolster are guided and lower portions which are wider than the upper portions and through which the bolster ends may be inserted into or removed from the opening, the bolster-supporting springs being insertable beneath the bolster or removable from beneath the bolster when the bolster is lifted to the top of the side frame opening.

In order to obtain better riding qualities for railway trucks it is desirable to provide a maximum amount of spring deflection. This can best be accomplished by adding additional springs, in series, to the standard springs usually provided. These additional springs should be designed to act as load-carrying springs for light or merchandise loading and at such loading the heavier capacity springs will act as snubbers to break up harmonics. With the heavier or capacity loads the additional or light capacity springs will serve as shock absorbers and by absorbing road shocks will prevent them reaching the heavier capacity springs or car body and thereby eliminate harmonics. At the same time the heavier capacity spring will serve as perfect load-carrying springs since they will be carrying the load they are designed for.

In applying differential cushioning springs to trucks of the self-aligning type, it is extremely difficult to mount superposed spring sets of the desired capacity and deflection characteristics in the space between the bolster and the bottom of the side frame opening.

It is an object of the present invention to provide a means of mounting superposed cushioning springs beneath the bolster which will permit the use of springs which have an adequate range of movement and desirable deflection characteristics.

A further object of the invention is to provide a spring-supporing member which is guided for vertical movement in the side frame opening and which is provided with vertically offset spring seats which receive the springs supporting and supported by the member.

A further object of the invention is to provide a grouping of springs which provides a level support for the bolster and which effects an advantageous distribution of the load upon the side frames.

With the above and other objects in view, the invention may be said to comprise the car truck as illustrated in the accompanying drawings, hereinafter described and particularly set forth in the appended claims, together with such variations and modifications thereof as will be apparent to one skilled in the art to which the invention pertains.

Reference should be had to the accompanying drawings forming a part of this specification, in which:

Figure 1 is a fragmentary side elevation of a car truck embodying the invention, a portion of the side frame, bolster and spring plate being broken away and shown in section;

Fig. 2 is a top plan view of the spring plate;

Fig. 3 is a side elevation of the spring plate;

Fig. 4 is a fragmentary top plan view of the central portion of one side frame and one end of the bolster, a part of the top of the side frame being broken away to show the underlying portions of the bolster and spring plate;

Fig. 5 is a section taken on the line indicated at 5—5 in Fig. 1;

Fig. 6 is a sectional view showing the modified form of bolster guide; and

Fig. 7 is a sectional view showing an alternative form of bolster guide.

The car truck of the present invention is of the conventional self-aligning type in which a bolster is supported at its ends upon side frames. In the accompanying drawings, one side frame only is shown, it being understood that the structure illustrated is duplicated on the opposite side of the truck.

The side frame of the present invention has a top chord 1 and a bottom chord 2 which are connected at their ends to journal boxes 3 (one of which is shown) which support the frame upon the axles. The side frame has a bolster-receiving opening and the portion of the bottom chord 2 extending across the bottom of the opening has a horizontal bottom web 4 and vertical side walls 5.

The depth of the bottom chord at the central portion of the opening is less than at the sides of the opening, the side walls 5 having end portions in the form of flanges 6 tapering upwardly to the opposite sides of the bolster opening. The central

portion of the bottom chord is provided with a horizontal top wall 7 which provides a seat inwardly of the flanges 6 to limit the movement of a spring-supporting member, as will be hereinafter explained.

The top and bottom chords are connected by spaced columns 8 which form sides of the bolster opening, the columns 8 being of channel-shaped in cross section, having webs 9 facing the opening and side flanges 10 extending from the webs 9 toward the ends of the side frame. Columns 8 have upper vertical guide portions 11 and the lower vertical guide portions 12. The webs 9, which are vertically disposed in the lower guide portion 12, extend down into the spaces between the flanges 6. The lower portion of the side frame opening is considerably wider than the upper bolster-guiding portion and the connecting portions 13 of the columns 8 converge upwardly from the lower vertical portion 12 of the web to the upper guide portion 11.

A bolster 14 has end portions 15 of reduced depth and of rectangular cross section, which are guided between the vertical guide portions 11 of the columns, the bolster having integral projecting flanges 16 on each side thereof which straddle the guide portions 11 of the columns. The bolster-guiding elements may be of various forms. As shown in Fig. 6, bolster guide flanges 16 may be provided with tapering inner faces 17 which coact with similarly tapered faces at the sides of the guide columns and faces 18 of the guide columns may be made concave to receive a convex face 19 formed on the bolster between the guide flanges. As shown in Fig. 7, the side faces of the bolster between the guide flanges 16 may be provided with reversely inclined, inwardly converging faces 20 and the face of the column may be provided with correspondingly inclined faces 21 to fit in the groove formed by the faces 20.

The bolster end 15, however, with its guide flanges is wider than the upper portion of the side frame opening and in assembling the bolster with the side frame, the bolster is first inserted through the wider lower portion of the side frame opening and is then lifted into the narrow upper portion of the opening. While the bolster is held against the top of the side frame opening, suitable supporting springs are mounted beneath the bolster. In dismantling the truck, the procedure may be reversed, first lifting the bolster to the top of the opening, then removing the supporting springs, then lowering the bolster into the wider lower portion of the opening and removing the side frame laterally.

In trucks of the self-aligning type, each end of the bolster is usually supported upon a group of springs which are disposed beneath the end of the bolster and rest directly upon the bottom chord. These spring groups may have light spring plates, top or bottom, or both, which serve to position the springs or hold them together as a group.

In the truck of the present invention, a conventional group of bolster springs is provided beneath the end of the bolster, but this spring group is mounted upon a spring plate 22, which is mounted for vertical movement between the lower vertical guide portions 12 of the columns. The plate 22 has portions 23 projecting laterally from the center portions of its sides, which are raised with respect to the remainder of the plate and which are of a width to fit between the upwardly tapering flanges 6 of the bottom chord adjacent the guide columns.

The bottom faces of the projections 23, which are flat and which are preferably provided with spring bosses 23a, serve as caps for the upper ends of coil springs 24 which are closely adjacent the vertical portions 12 of the columns, the springs 24 being mounted upon the web 4 of the bottom chord and guided by the vertical webs of the column, the bottom chord flanges and the ends of the seats 7. The spring plate 22 has a marginal upstanding flange 25 which extends around the edges of the projections 23 and throughout the entire perimeter of the plate. Portions of the flange 25 at the ends and sides of the projections 23 coact with the vertical web portions 12 of the columns and side flanges 6 to guide the plate for vertical movement in the side frame opening. The upper face of the spring plate 22 provides a seat for a conventional group of bolster springs at a level below the upper ends of the springs 24 which engage the raised cap portions 23 of the plate.

Bolster spring groups are commonly mounted on seats adapted to accommodate four or five coil springs. In some instances the groups may consist of one or two less springs than the seats are adapted to accommodate and sometimes one of the springs of each group may be replaced by a snubber. The spring plate 22 as herein shown is adapted to provide a seat for a group of five coil springs, it being understood that certain of the springs may be omitted or replaced by a snubber as in conventional bolster spring groups.

As herein shown, positioning lugs 26 on the upper face of the plate, equally spaced from the center thereof, serve to position a central bolster spring 27 which may be mounted midway between the projecting portions 23. At the inner side of the plate 22, two laterally spaced front springs 28 may be mounted and at the outer side of the plate 22, two laterally spaced back springs may be mounted, the two pairs of springs being positioned on the plate by the inner and outer lugs 26 and by the marginal flange 25 of the plate, which may be rounded at the corners. The cap portions 23 of the spring plate are raised sufficiently with respect to the remainder of the plate to provide ample height for the lower springs which overlap the lower ends of the bolster springs and are nested in the spaces between the front and back springs.

The spring plate 22 is supported at its ends upon the two coil springs 24 and in turn supports a conventional group of bolster springs of equal length which are seated upon the top face of the spring plate 22 and engage the bottom of the bolster. The springs 24 are much more widely spaced than the bolster-supporting springs, being positioned closely adjacent the lower ends of the columns and beneath the inclined portions 13 thereof. The wide spacing of the springs 24 is advantageous in that they provide a stable support for the spring plate 22 which carries a compact group of bolster springs in the space between the springs 24, and for a further reason that the wide spacing of the springs 24 effects an advantageous distribution of stresses in the side frame.

The springs 24 are of a length to normally support the spring plate above the seating portion of the bottom chord. These springs are preferably of sufficient capacity to hold the spring plate slightly above its seat when the car is loaded to capacity, but weak enough to permit the spring plate to seat when they are subjected to a pres-

sure somewhat in excess of the maximum static load.

The spring group upon which the bolster is supported, which may be the same as would ordinarily be provided for cushioning the car if the spring group were supported directly upon the side frame, is designed to cushion the car with a full capacity load. It is desirable that the springs acting in series be capable of cushioning normal road shocks when the car is lightly loaded. To provide a soft cushion for light loads, it is desirable that the springs 24 be of considerably less capacity than the bolster springs. For example, if the car be a car of fifty tons capacity and the upper spring group be designed for cushioning a car of that capacity, the springs 24 may have the capacity required for cushioning a twenty-ton pay-load, i. e., springs 24 may be springs which if used alone would satisfactorily cushion a car of twenty-tons capacity.

The seat 7 may be provided with a suitable buffer pad 30 to cushion impacts of the plate 22 against the seat 7, the pad 30 being preferably composed of layers of rubber and fabric.

The spring plate 22 may be provided with holes 31, which are disposed centrally of the bolster springs seated on the plate, which permit dirt to escape through the plate. The seat 7 of the bottom chord may be provided with a hole 32 that registers with the center hole 31 in the plate 22, and additional holes 33 may be provided in the web 4 centrally of the springs 24.

By offsetting the seats for the lower springs with respect to the seats for the bolster springs, applicant is enabled to employ standard bolster springs and to employ a spring combination that has the proper capacity and deflection characteristics for differential cushioning and that is of a height such as not to interfere with the assembly or disassembly of the parts.

It will be understood that various modifications of the constructions shown may be resorted to without departing from the spirit of this invention as defined in the appended claims.

What I claim is:

1. A car truck having a side frame provided with top and bottom chords and spaced connecting columns forming a central opening, the portion of the bottom chord forming the bottom of the opening providing a seat centrally of the opening and spring pockets under the ends of the opening, springs seated in said pockets and projecting into the opening, a vertically movable bolster in said opening, a spring supporting member guided for vertical movement in the opening beneath the bolster, said member having a central portion engageable with said seat, spring seating portions upon its top face and end portions upwardly offset with respect to said spring seating portions and resting upon said springs, and bolster supporting springs mounted on said spring seating portions of said member.

2. A car truck having a side frame provided with top and bottom chords and spaced connecting columns forming a central opening, a bolster guided for vertical movement in said opening, a one-piece spring plate between said columns and guided for vertical movement in the opening beneath said bolster, said spring plate having spring-seating portions upon its top face and upwardly offset portions at opposite ends thereof and over the bottom chord providing spring caps which are at a higher level than the top seating portions, springs interposed between the bottom of the bolster and the seating portions on the top face of said plate, springs beneath said plate supported on the bottom chord and engaging said caps, and a seat carried by the bottom chord centrally of the opening and between the last mentioned springs for limiting the downward movement of said plate with respect to the side frame to limit the pressure which can be exerted upon the lower springs.

3. A car truck having a side frame provided with a central opening and vertically disposed guide channels at opposite ends of the opening adjacent the bottom thereof, a bolster guided for vertical movement in said opening, a one-piece spring plate guided for vertical movement in the opening beneath said bolster, said spring plate having spring-seating portions upon its top face and upwardly offset centrally disposed end portions providing spring caps which are at a higher level than the top seating portions and which are positioned in said guide channels, springs spaced laterally of the bolster and interposed between the bottom thereof and the top seating portions of said member, and springs beneath opposite ends of the opening supported on the side frame and engaging said caps, the latter springs being more widely spaced than the bolster-engaging springs.

4. A car truck having a side frame comprising top and bottom chords and spaced columns connecting the chords and forming a central opening in the side frame, said columns having upper vertical guide portions and lower vertical guide portions more widely spaced than said upper portions, the portion of said bottom chord forming the bottom of said opening having spring pockets beneath opposite ends of said opening, lower cushioning springs mounted in said pockets, a spring plate guided between the lower ends of said columns and having raised cap portions at the ends thereof resting upon said springs, said plate having portions of its upper face disposed at a lower level than the said raised cap portions, upper cushioning springs mounted upon said portions of the upper face of said plate, and a bolster guided between the upper guide portions of said columns and resting upon the said upper cushioning springs.

5. A car truck having a side frame comprising top and bottom chords and spaced columns connecting the chords and forming a central opening in the side frame, said columns having upper vertical guide portions and lower vertical guide portions more widely spaced than said upper portions, the portion of said bottom chord forming the bottom of said opening having spring pockets beneath opposite ends of said opening, a spring-supporting member between the lower guide portions of the columns, said member having raised portions providing a spring cap centrally of its ends adjacent each column and over each pocket and having front and back spring-seating portions, springs mounted in the bottom chord pocket and engaged by said caps, springs mounted upon the front and back seating portions of said member, and a bolster supported upon the latter springs and guided between the upper portions of the columns.

6. A car truck having a side frame comprising top and bottom chords and spaced columns connecting the chords and forming a central opening in the side frame, said columns having upper vertical guide portions and lower vertical guide portions more widely spaced than said upper portions, the portion of said bottom chord forming the bottom of said opening having spring pock-

ets beneath opposite ends of said opening, a bolster having an end portion guided for vertical movement between the upper portions of the columns, a spring-supporting member between the lower guide portions of the columns, said member having a raised end portion adjacent each column shaped to provide a spring cap and overlying the adjacent pocket, said member having a top face with front and back spring-seating portions which are below the level of said caps, coil springs mounted in the bottom chord pockets and engaging said caps, and coil springs interposed between the bolster and the front and back seating portions of said member.

7. A car truck having a side frame provided with a central opening and a member extending across the bottom of said opening, said member having a low central portion forming a seat, a bottom web and side walls which taper upwardly from the central seat to the sides of the opening, a bolster guided for vertical movement in said opening, a spring-supporting member extending across the opening beneath the bolster, said member having a central portion engageable with said seat and raised projecting portions guided between the tapering side walls of the bottom member, springs interposed between the web of the bottom member and said raised projecting, portions of said member, and springs interposed between the top face of said member and said bolster.

8. A car truck having a side frame provided with a central opening and a member extending across the bottom of said opening, said member having a low central portion forming a seat, a bottom web and side walls which taper upwardly from the central seat to the sides of the opening, a bolster guided for vertical movement in said opening, a spring-supporting member extending across the opening beneath the bolster, said member having a central portion engageable with said seat and raised projecting portions guided between the tapering side walls of the bottom member, a coil spring interposed between the web of the bottom member and each of said projecting raised portions of said member, a central coil spring interposed between the bolster and the portion of said member between said raised projecting portions, and pairs of coil springs interposed between said bolster and supporting member on opposite sides of said central spring.

9. A car truck having a side frame provided with top and bottom chords and connecting guide columns forming a central opening, the portion of said bottom chord forming the bottom of the opening having a horizontal seating portion centrally of said opening and spring receiving pockets beneath the ends of the opening and at opposite ends of said seating portion, each spring pocket having side walls projecting above said seat, said opening having a centrally disposed upper portion narrower than the bottom portion thereof, springs mounted in said spring pockets, a spring plate having end portions guided by the side walls of said pockets and resting upon said springs, a bolster guided in the narrower upper portion of said opening and springs interposed between said spring plate and bolster.

10. A car truck having a side frame provided with top and bottom chords and connecting guide columns forming a central opening, the portion of said bottom chord forming the bottom of the opening having a horizontal seating portion centrally of said opening and spring receiving pockets beneath the ends of the opening and at opposite ends of said seating portion, each spring pocket having side walls projecting above said seat, said opening having a centrally disposed upper portion narrower than the bottom portion thereof, springs mounted in said spring pockets, a spring plate overlying said seat and projecting past opposite side of the side frame, said plate having projections at its ends guided between the side walls of the pockets and resting upon said springs, a bolster guided in the narrower upper portion of the opening, and springs interposed between the spring plate and bolster, one of said springs being disposed centrally of said plate in alinement with the spring pockets and other of said springs being disposed upon the projecting side portions of said spring plate.

RUDOLPH LEPPLA.