United States Patent [19]

Howard

[11] **3,768,419**

[45] **Oct. 30, 1973**

[54] **DAMPENED RAILWAY FREIGHT CAR TRUCK**

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[73] Assignee: **Halliburton Company**, Duncan, Okla.

[22] Filed: **Nov. 25, 1970**

[21] Appl. No.: **92,626**

[52] **U.S. Cl.**..... **105/182 R**, 105/180, 105/181, 105/200, 105/203, 105/206 R, 188/59

[51] **Int. Cl.** **B61f 5/12**, B61f 5/26, B61h 13/00

[58] **Field of Search** ..... 105/157 R, 182 R, 105/197 R, 199 R, 199 C, 208, 189, 193, 197 D, 197.1, 197.2, 198, 200, 181, 203, 206 R; 188/33, 58, 59

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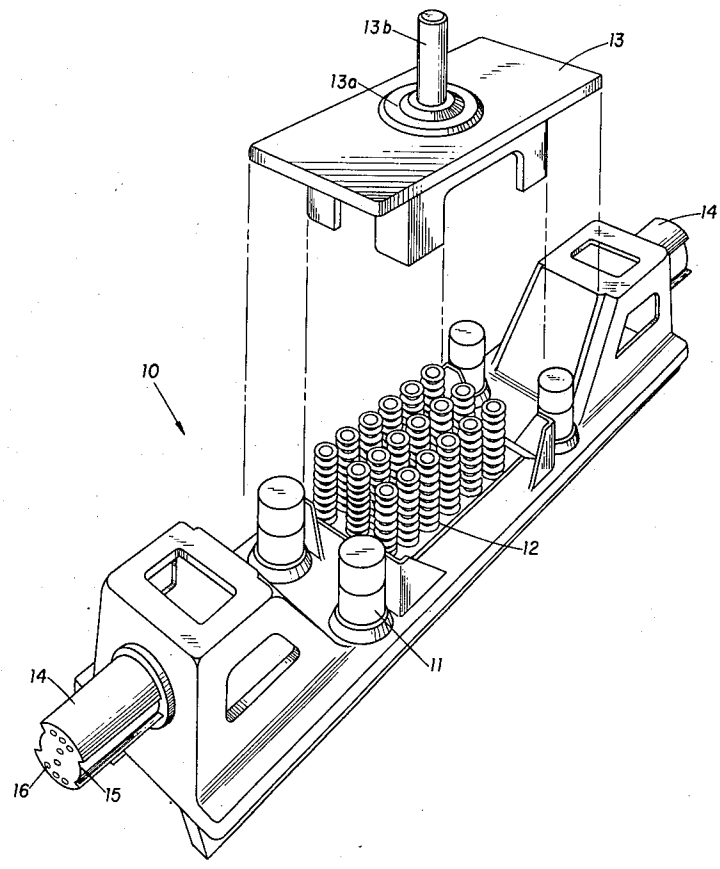
[57] **ABSTRACT**

This invention relates to a freight car truck and more particularly to a center suspension system mounted on the center of the truck bolster, to individually mounted wheels having separate brake systems, and to a side frame which enjoys rotational freedom about a bolster axle.

15 Claims, 8 Drawing Figures



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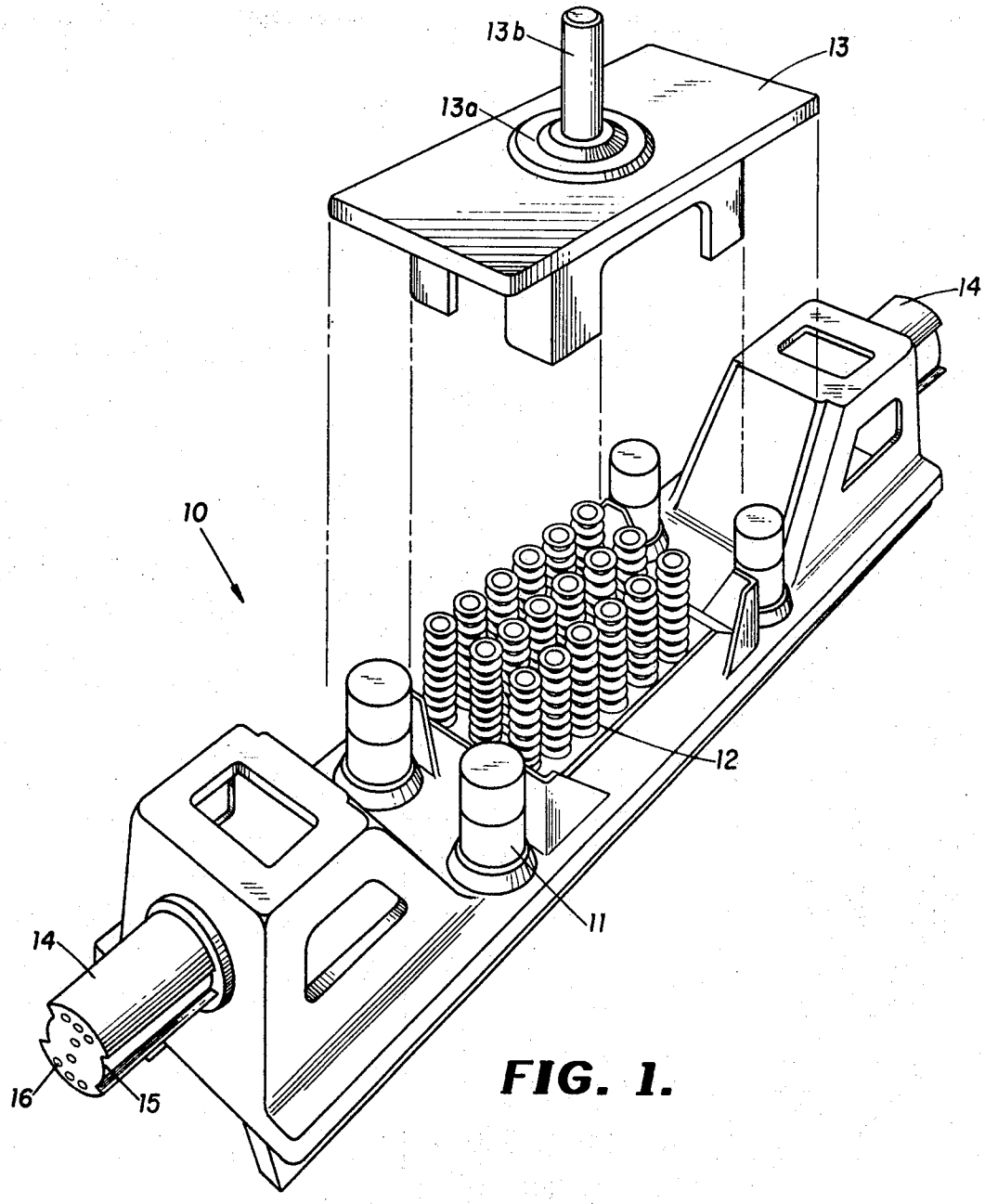

FIG. 1.

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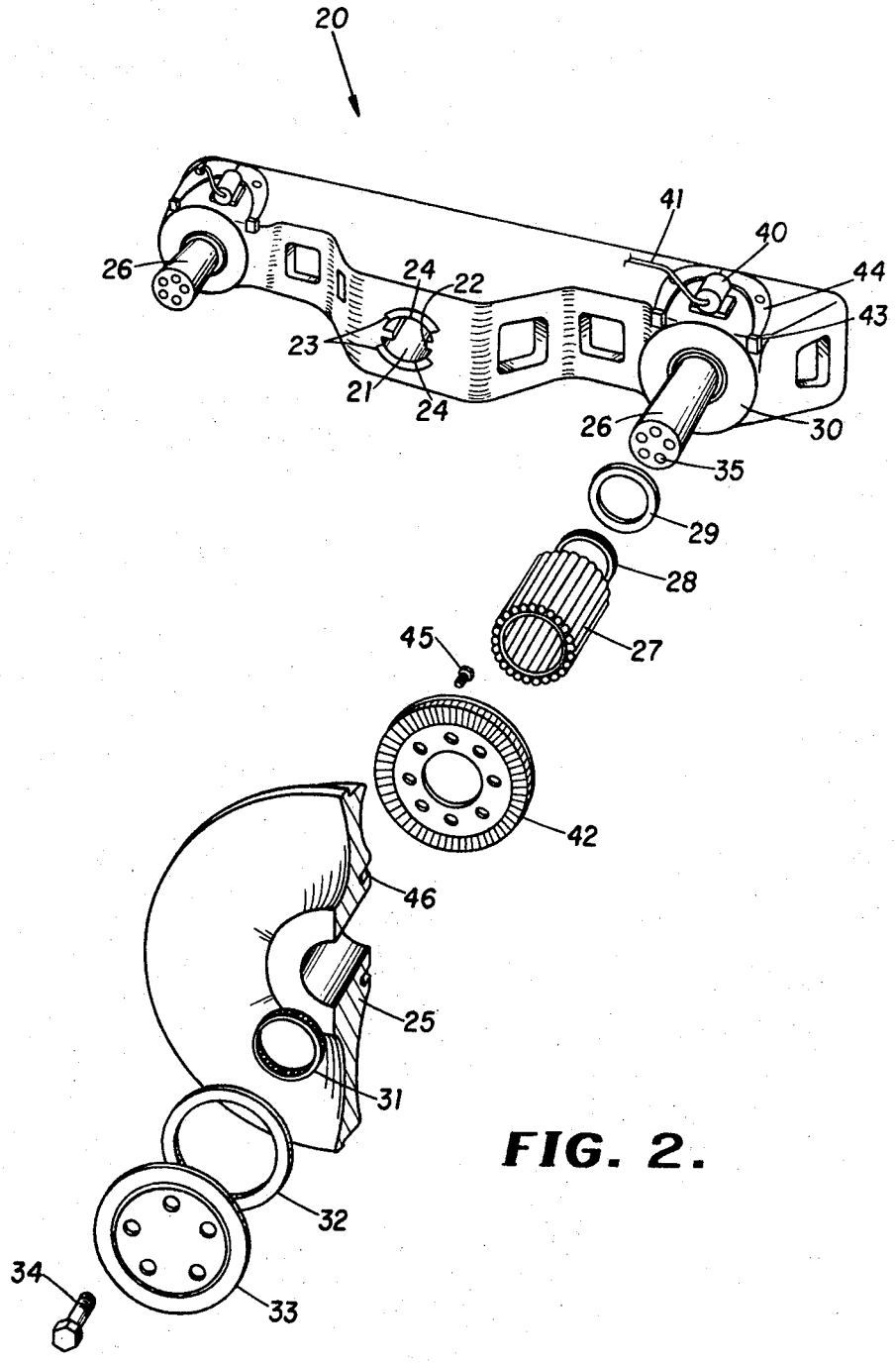

FIG. 2.

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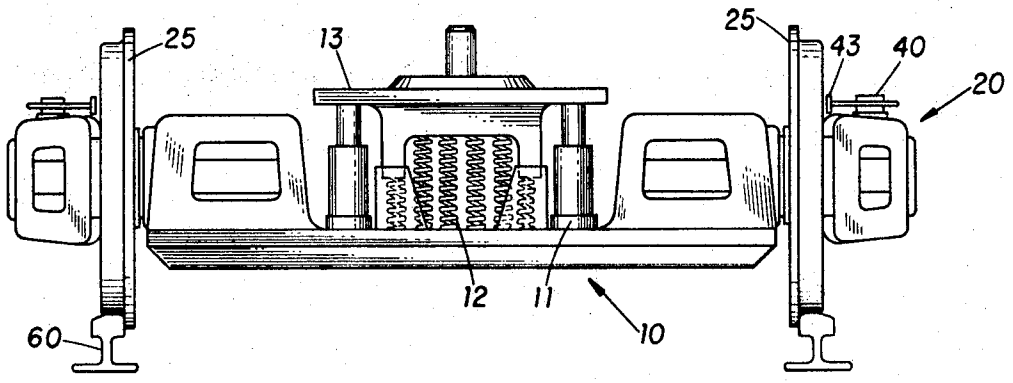

FIG. 2a.

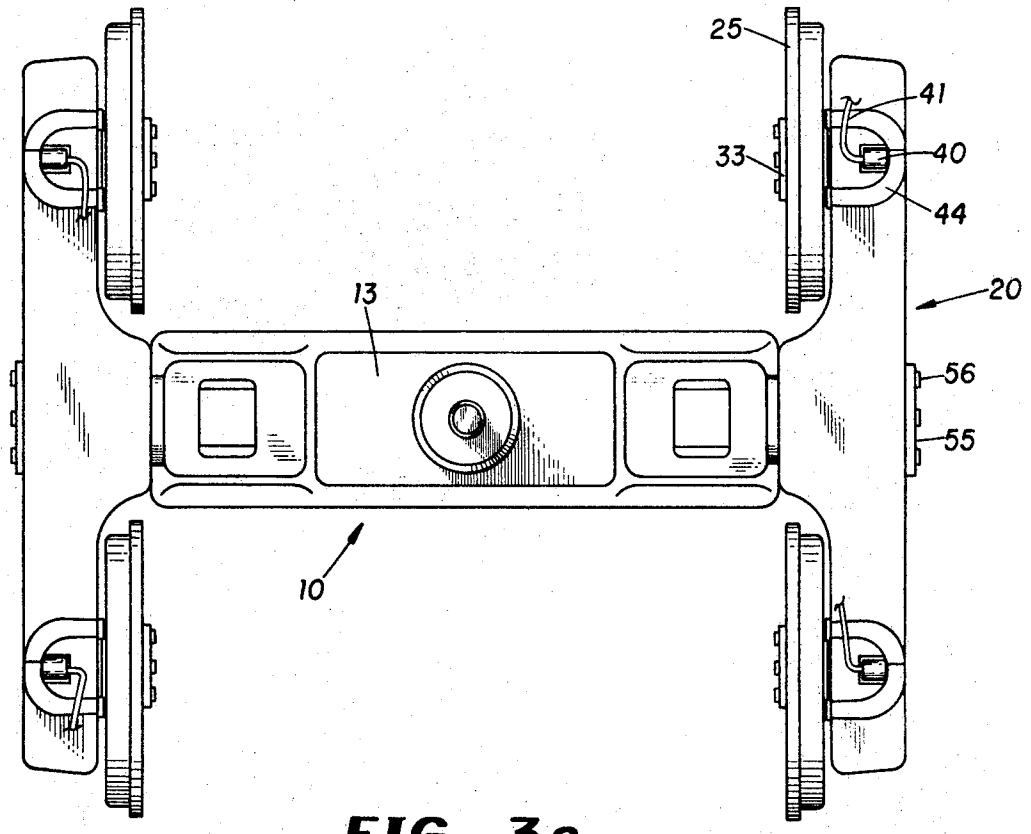

FIG. 3c.

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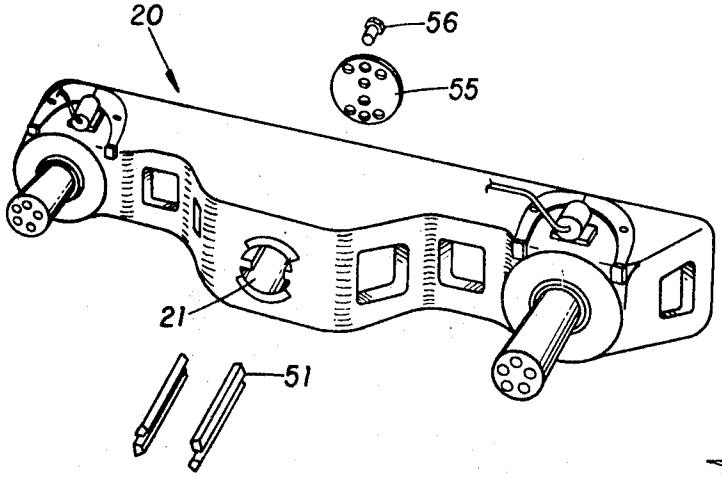

FIG. 3a.

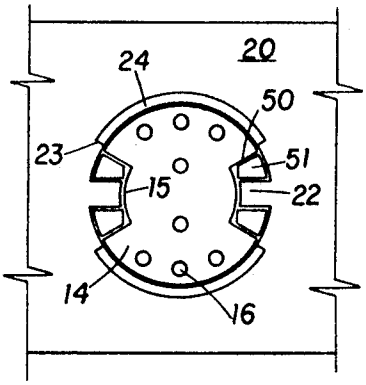

FIG. 3b.

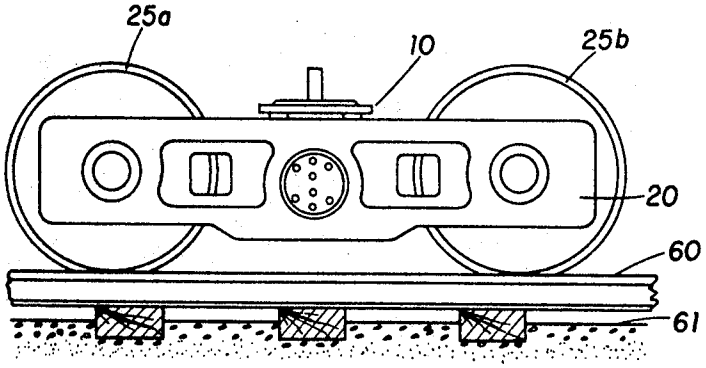

FIG. 3d.

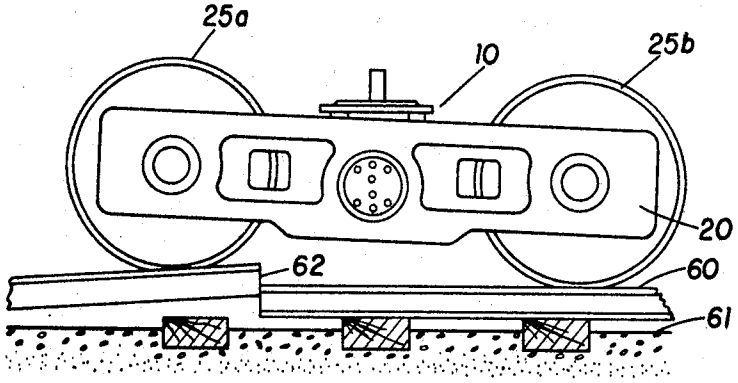

FIG. 3e.

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DAMPENED RAILWAY FREIGHT CAR TRUCK

BACKGROUND OF THE INVENTION

As early as 1831 the four-wheel truck was introduced onto the American railroad scene. Since that date many improvements have been made to the truck so that today it continues to be the standard for practically all conventional freight cars. However, the basic design has changed little. That is, the side frames rest on solid axles having pressed on wheels. The side frames in turn support the bolster on which the freight car rests.

Shocks caused by road roughness are absorbed by a suspension system located midpoint in a pocket on each side frame beneath the end of the bolster projecting into the pocket. As noted above, the wheels are pressed on to an axle so that as one wheel hits an unevenness, such as a displaced rail joint, the shock is transmitted both to the other wheel via the solid axle and to the bolster via the side frame and suspension system.

On-tread brakes are normally used on four-wheel freight car trucks. In the conventional truck, each of the four brake shoes are forced into engagement with the wheel treads via brake beams connected to a common air cylinder located on the truck.

The wheel and axle assembly described above constitutes a highly stressed mechanical system. The wheel must not only support its share of the car weight but must also, by the action of its flange, serve to steer the vehicle along the rail. Because of the rigid mounting of wheels on the axle, the wheel may be subjected to torsional stresses imposed by the different distances which the wheel may have to traverse when rounding curves. In addition to these mechanical loads, the heating produced by tread braking may impose stresses much higher and more likely to cause distress, than any other external force.

The present invention provides a freight car truck, which comprises:

a. a bolster having energy dampeners and neutral positioning means positioned thereon,
b. a pair of side frames, each of said frames positioned to one end of said bolster,
c. four axles each positioned on one end of each of said frames,
d. four wheels, each rotatably mounted on one of said axles, and
e. means operable to prevent rotation of said wheels about said axles.

In order to more fully describe the present invention, reference is made to the accompanying drawings wherein:

FIG. 1 is a truck bolster showing energy dampeners and the spring cluster arrangement;

FIG. 2 shows a side frame, individual wheel axles, a wheel and a wheel brake constructed in accordance with the invention;

FIG. 2*a* shows the assembled truck from a front view;

FIGS. 3*a*, 3*b*, 3*d* and 3*e* illustrate the features of the rotatable side frame of the present invention;

FIG. 3*c* shows the assembled truck from a top view.

DETAILED DESCRIPTION

FIG. 1 shows a truck bolster **10** with energy dampeners **11** and spring cluster **12** positioned in the center of bolster **10** below center bearing **13** on which is mounted center plate **13***a* and removable center pin **13***b*. Center plate **13***a* is compatible with existing standard body center plate designs. Fixed to either end of bolster **10** is stationary axle **14**. Longitudinal grooves **15** located on either side of axle **14** perform a function which will be discussed below. Threaded apertures **16** will also be discussed later.

FIG. 2 illustrates side frame assembly **20** as seen from the inside of the rails (not shown) looking outward. Aperture **21** is adapted to receive stationary axle **14** (FIG. 1). Keys **22** positioned within aperture **21** are adapted to receive grooves **15** on axle **14**. Pressed into recesses **23** located at the top and bottom of aperture **21** are bearing surfaces **24**.

Wheel **25**, mounted on stub axle **26**, revolves about roller bearings **27** and against thrust bearing **28**. Bearing seal **29** is interposed between bearing **28** and stub axle plate **30**. Thrust bearing **31**, rotating seal **32** and wheel retainer **33** completes the wheel assembly. Bolts **34** threadedly engaged to stub axle **26** via threaded apertures **35** on axle **26** hold the wheel assembly to axle **26**.

A hydraulic-operated brake system, operable by and compatible with existing standard brake actuated systems, consists of hydraulic brake cylinder **40** and finned-brake drum **42**. Brake shoes **43**, attached to brake arms **44**, are forced against drum **42** via actuation of cylinder **40**. Drum **42** is attached to wheels **25** via bolts **45** and threaded apertures **46**. Brake cylinder **40** is actuated either by hydraulic fluid or by compressed air via hose **41** leading from an actuating system located on the car body and in the locomotive (not shown).

FIG. 2*a* illustrates the fully assembled truck from a front view.

Turning now to FIGS. 3*a*, 3*b*, and 3*c*, details of rotating side frame assembly **20** is shown. Aperture **21** has keys **22** positioned on either side as shown. FIG. 3*b* shows axle **14** positioned within aperture **21**. Placed between keys **22** and end walls **50** of grooves **15** are resilient wedges **51** whose function is to limit rotation of side frame assembly **20** gradationally. Retaining axle **14** to assembly **20** is apertured plate **55** which is bolted to axle **14** via bolts **56** and threaded apertures **16** (FIGS. 1 and 3*b*). The diameter of plate **55** exceeds the diameter of aperture **21** so that axle **14** cannot dissociate itself from assembly **20**. FIG. 3*c* is a top view of the truck showing the relation between bolster **10** and assembly **20**.

The functional feature of side frame assembly **20** is illustrated in FIGS. 3*d* and 3*e*. FIG. 3*d* shows the relationship of bolster **10**, side frame assembly **20** and wheels **25***a* and **25***b* to the railroad bed symbolized by line **61**. As is apparent, all units are parallel thereto. FIG. 3*e* shows how the relationship illustrated in FIG. 3*d* has been partially changed upon wheel **25***a* hitting unevenness **62** in rail **60**. Because of the freedom of circular motion enjoyed by assembly **20** about axle **14**, bolster **10**, and the freight car (not shown) riding thereon remain parallel to bed **61** while wheel **25***a* and assembly **20** move up over unevenness **62**.

The rotational freedom of the instant invention applies equally well whether rail unevenness occurs on one or both rails, and if on both, whether such is parallel or staggered. It is apparent that the rotational freedom allows wheels **25** and assembly **20** to conform to rail conditions on one side without transmitting the re-

sults of such conditions to the other side or to the freight car positioned on top of bolster **10.**

The feature of the instant invention whereby energy dampeners **11** and spring cluster **12** are incorporated into the truck bolster about center plate **13,** offers both a control of body sway and vertical oscillations, and an increased space for mounting additional hydraulic dampeners without reducing the number of springs required in a particular application. The additional hydraulic dampeners will break up the harmonic action of the spring group quicker and therefore lessen possible damage to the cargo.

Another important feature of the present invention, is the use of individual stub axles for mounting each wheel. Such individual mounting permits easy and rapid changing of separate wheels, rather than the entire axle and both heels pressed thereon, which the current trucks require.

While the illustrated embodiment of the present invention utilizes roller bearings **27** in the wheel assembly, it is apparent to those skilled in the art that other type bearings can be used therein equally well.

Further, there is an important weight savings by eliminating the solid one piece axle and pressed on wheels currently being used. Also, the individual freedom of each wheel to rotate independently of the others should be conducive to better tracking on curves and elimination of torque produced by present fixed solid one piece axles.

The hydraulic actuated brake system employing the single disc brake introduces the modification, as described above, of mounting individual cylinders **40** each wheel **25** and having two shoes **43** acting against each drum **42.** Not only is greater safety achieved by having such individual cylinders **40,** but more responsive braking is available from dual shoes **42** over a conventional single disc hydraulic brake system.

It will be apparent that many different embodiments of this invention may be made without departing from the spirit and scope thereof, and therefore it is not intended to be limited except as indicated in the appended claims.

What is claimed is:

1. A railroad car truck, which comprises:

a. a bolster having energy dampeners and neutral positioning means positioned thereon;

b. a pair of single beam side frames, each of said frames having key means therein and being pivotally attached to one end of said bolster;

c. four cantilevered axles, each positioned on one end of each of said frames;

d. four wheels, each rotatably mounted on one of said axles;

e. brake means selectively operable to retard rotation of said wheels about said axles; and

f. a pair of substantially cylindrical stub axles each having keyway means therein, each said axle extending one from each side of said bolster wherein said keyway means engages said key means thereby limiting rotational movement of said frames on said axles.

2. A four-wheel truck which comprises:

a. a bolster having an axle extending outwardly from each end of said bolster;

b. two single beam side frames having limiting means thereon for limiting rotation of said frames about said bolster axles;

c. four wheels;

d. cantilevered means for rotatably attaching one of said four wheels to each end of said two side frames;

e. braking means attached to ach of said wheels for cooperatively acting in conjunction with braking means attached to each end of said side frames so that said wheels may be prevented from rotation.

3. The four-wheel truck of claim **2** wherein said bolster is provided with:

a. a center bearing having a center plate positioned thereon, said bearing and plate adapted to receive a railroad freight car;

b. a plurality of spring means positioned between said bolster and said center bearing, said spring means permitting movement of said bolster relative to said center bearing; and

c. a plurality of energy dampening means positioned between said bolster and said center bearing.

4. A bolster for use with railway car trucks having side frames, which comprises:

a. an elongated body having a center bearing positioned at a point substantially equidistant from either end;

b. a plurality of spring means centrally positioned between said bolster and said center bearing, said spring means permitting vertical movement of said bolster relative to said center bearing;

c. a plurality of hydraulic action energy absorbing means generally centrally positioned between said bolster and said center bearing, said absorbing means dampening said vertical movement of said bolster relative to said center bearing; and

d. a pair of generally cylindrical axles, each positioned on one end of said bolster, said axles having keyway means thereon and being adapted to receive the side frames, with key means on said side frames, located therebetween to limit rotation of said side frames on said axles.

5. A railway truck for placement under a railway car, comprising:

a. a laterally extending structured bolster;

b. axle means projecting from each end of said bolster;

c. energy absorbing means attached to said bolster in a substantially central location on one side of said bolster;

d. energy dampening means attached to said bolster in a substantially central location on one side of said bolster;

e. center plate support means movably located on said bolster and contacting said energy absorbing means and said energy dampening means;

f. means attached to said center plate support means for movably locating said center plate support means in a railway car;

g. side frame means located one on each of said axle means projecting from said bolster, said side frame means semi-rotatably attached to said axle means and adapted to move angularly around said axle means through a portion of one revolution;

h. four or more non-rotatable cantilever axle stubs located at least one near each end of said side frame means, said axle stubs being permanently and non-rotatably attached to the inward facing side of said side frame means and adapted to receive wheels;

i. four or more sets of wheel means containing bearings, each of said wheel means being rotatably attached to each of said axle stubs and adapted to rotate independently of one another; and

j. brake means attached to said railway truck and adapted to top rotation of said wheel means on said axle stubs.

6. The railway truck of claim **5** wherein said four or more sets of wheel means comprises four wheels, said energy absorbing means comprises a plurality of coil springs, said energy dampening means comprises hydraulic dampeners, and said axle means and said side frame means contain key slot means capable of loose mating engagement and further adapted to prevent free rotation of said side frame means about said axle means.

7. The railway truck of claim **6** further comprising resilient means inserted between said axle means and said side frame means in said key slot means and capable of resiliently further limiting rotation of said side frame means about said axle means.

8. A railway truck for placement under a railway car, said truck being capable of traversing curves and vertical discontinuites in railway tracks without causing spinning of the wheels due to differences in velocities between wheels on the inside rail and wheels on the outside rail and without causing transmittance of vertical shocks from one wheel to all other wheels, comprising:

a. a lateral bolster member adapted to be disposed substantially perpendicular to the longitudinal axis of the railway car and arranged to substantially support the railway car;

b. energy absorbing and dampening means located on said bolster member between said bolster member and said railway car;

c. two lateral frame members movably and transversely affixed one to each end of said bolster member, with means therebetween to effect limited rotation of said frame members on said bolster member, each said

9. A truck for railway cars comprising:

a. an elongated primary bolster member having an elevated portion at each end thereof;

b. spring means located on top of said primary bolster member between said elevated portions;

c. hydraulic dampening means on top of said primary bolster member between said elevated portions;

d. generally cylindrical cantilevered bolster axle stubs projecting outwardly from each end of said bolster member;

e. a secondary bolster member movably positioned on said primary bolster member, contacting said spring means and said dampening means, and located substantially between said elevated portions;

f. two single member side frames each attached to each of said bolster axle stubs in a generally transverse orientation to said primary bolster member with limiting means between said side frames and said axle stubs, said limiting means arranged to limit rotation of said frames on said axle stubs;

g. two pairs of cantilevered cylindrical wheel axle stubs, each pair permanently attached to each of said frame members, with one wheel axle stub being located near each end of each said frame member;

h. wheel means rotatably attached to each of said wheel axle stubs; and

i. brake means on said bolster arranged to selectively retard rotation of said wheel means.

10. The truck of claim **9** further comprising:

a. roller bearings between said wheel means and said wheel axle stubs;

b. keyways in said bolster axle stubs; and

c. resilient keys inserted in said keyways in said bolster axle stubs and arranged to resiliently limit rotation of said side frames about said bolster axle stubs.

11. The truck of claim **10** wherein said hydraulic dampening means numbers four or more located around the periphery of said spring means, and said spring means further comprises four or more coiled springs placed in generally vertical orientation at or near the center of said primary bolster member.

12. A railway truck comprising:

a. a lower transverse bolster member;

b. an upper bolster member arranged above said lower bolster member;

c. energy absorbing means and dampening means between said upper and lower bolster members;

d. substantially cylindrical axle means extending laterally from each end of said lower bolster member said axle means having rotation limiting means thereon;

e. a center plate support located substantially in the center of said upper bolster;

f. a center plate alignment rod extending upward from the center of said center plate support;

g. two single beam side frames, one attached to each of said axle means in engagement with said rotation limiting means;

h. resilient limiting means between said side frames and said axle means, arranged to allow partial rotation of said side frames about said axle means and further arranged to resiliently stop said rotation after a certain predetermined mount thereof;

i. a plurality of cantilevered wheel axle means transversely attached to said side frames, one near each end thereof; and

j. wheel means rotatably mounted on each said cantilevered wheel axle means.

13. The truck of claim **12** wherein:

a. said cantilevered axle means are mounted inboard on said side frames in perpendicular relationship thereto; and

b. said wheel means further comprise roller bearings therein and retaining means adapted to prevent said wheel means from sliding on said wheel axle means.

14. The truck of claim **13** wherein:

a. said energy absorbing means comprises a plurality of coiled springs; and

b. said dampening means comprises hydraulic-action devices.

15. The truck of claim **14** wherein said rotation limiting means further comprises:

a. keyway slots located longitudinaly in the outer periphery of said axle means;

b. stationary key projections extending radially inward in axle openings in said side frames and arranged to fit loosely within said keyway slots; and

c. said resilient limiting means further comprising resilient movable keys adapted to be inserted between said key projections and said keyway slots and arranged to resiliently limit movement of said key projections in said keyway slots.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,768,419 Dated October 30, 1973

Inventor(s) Paul D. Howard

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In column 3 at line 17, change "heels" to --wheels--.

In column 3 at line 33, add --for-- before "each."

In claim 2, column 4 at line 5, change "ach" to --each--.

In claim 5, column 5 at line 6, change "top" to --stop--.

In claim 8, column 5 at line 42, after "said" add --frame member adapted to move independently of said other frame member;

(d) a plurality of wheel means, each independently and rotatably attached by cantilevered axle means to said frame means, each of said wheel means being capable of rotating each independently of the other; and

(e) brake means for stopping the railway car, said brake means attached to said railway truck.--

In claim 12, column 6 at line 38, change "mount" to --amount--

Signed and sealed this 5th day of March 1974.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

FORM PO-1050 (10-69)

* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334.