United States Patent

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[72] Inventor **Albert G. Dean**
Narberth, Pa.

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[73] Assignee **The Budd Company**
Philadelphia, Pa.

[54] **RAILWAY SPRING SUSPENSION**
1 Claim, 3 Drawing Figs.

[52] **U.S. Cl.** **267/3,**
105/197B, 105/199R, 267/33, 267/34, 267/35, 267/65R
[51] **Int. Cl.** **B61f 5/04,**
F16f 3/10, F16f 13/00
[50] **Field of Search** ..... 105/197, 199, 197 B; 267/3, 4, 33, 34, 35, 65 R

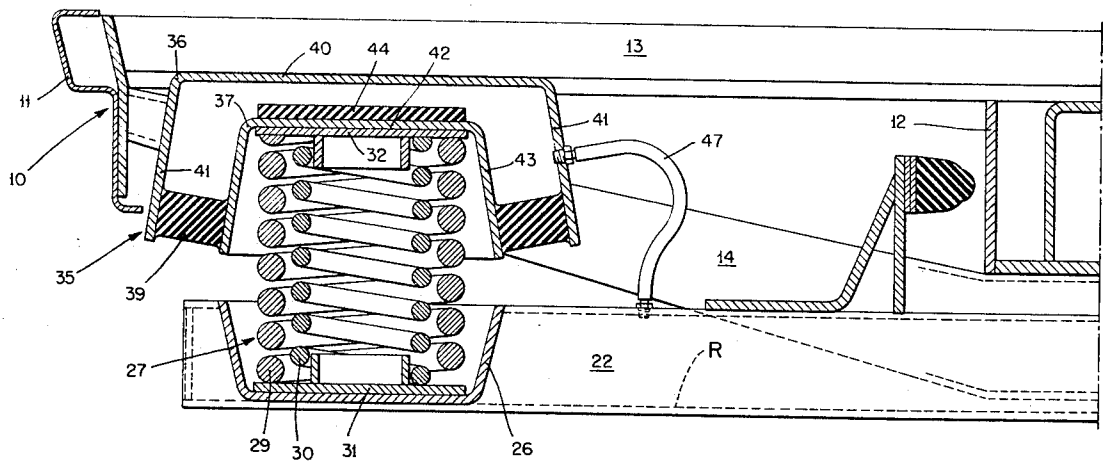
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Primary Examiner—Arthur L. La Point
Assistant Examiner—Howard Beltran
Attorneys—Thomas I. Davenport, Edward M. Farrell, Alford L. Trueax, Jr. and William R. Nolte

ABSTRACT: Air spring apparatus consisting of two axially aligned cylinders connected by an elastomer ring which provides an air seal. The shear capacity of the ring is slight permitting relatively free axial movement between the cylinders but is substantially incompressible to compression loads to prevent relative lateral movement of the cylinders.



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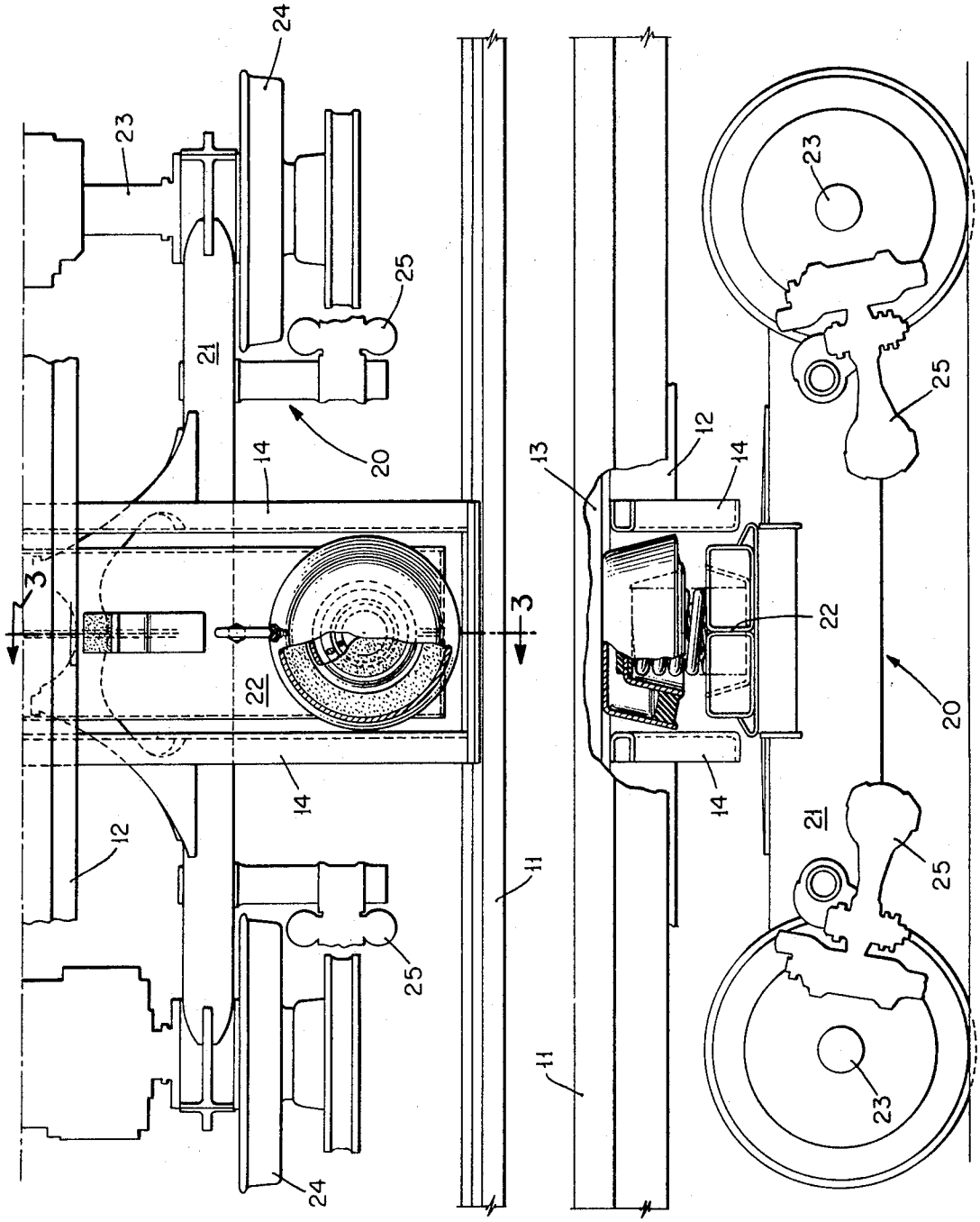


Fig. 2

Fig. 1

INVENTOR.
ALBERT G. DEAN
BY
William R. Nolte
AGENT

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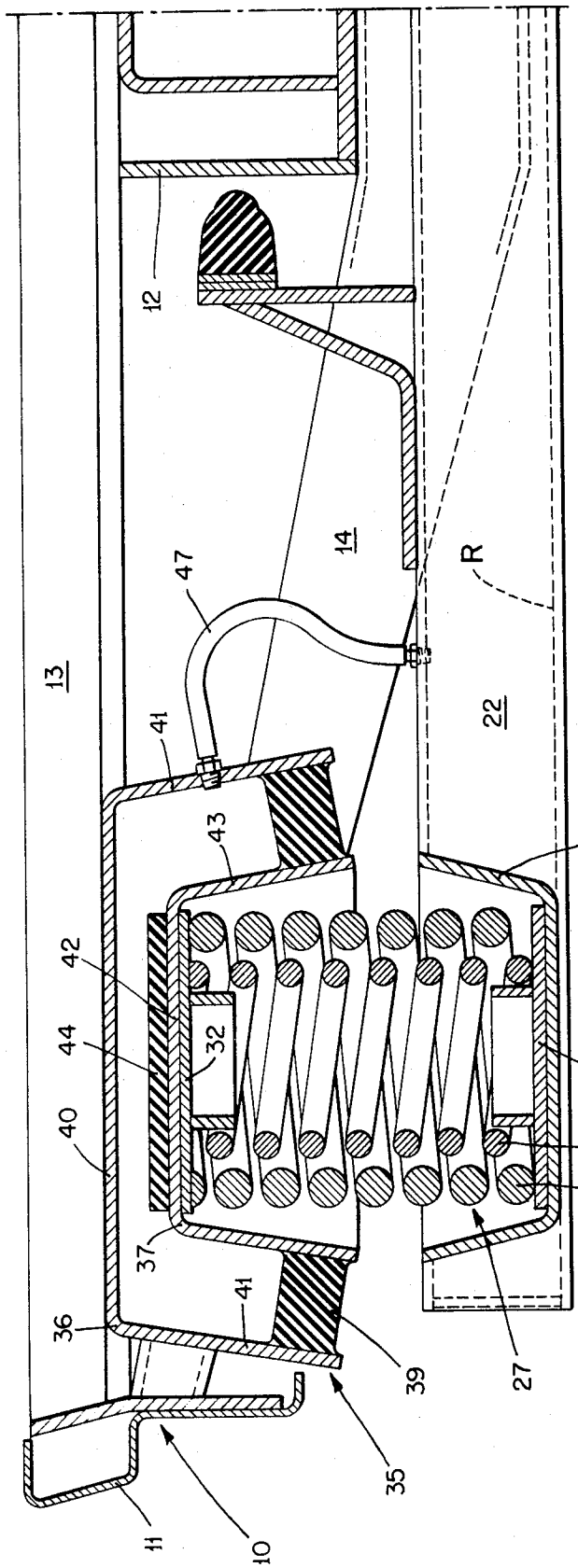


Fig. 3

INVENTOR.
ALBERT G. DEAN
BY
William R. Nolte
AGENT

RAILWAY SPRING SUSPENSION

Reference is made to applicant's copending application Ser. No. 659,948, filed Aug. 11, 1967, entitled "Series Pneumatic and Coil Spring Assembly," now U.S. Pat. No. 3,491,702, issued Jan. 27, 1970, and assigned to the same assignee as the present invention. This copending application discloses a combined pneumatic and structural coil spring suspension apparatus disposed between railway car truck and a vehicle body above. The pneumatic spring comprises flexible bellows which rest upon an inverted downwardly cupped spring seat which fits over the top of the structural coil springs. While the latter coil springs are effective to resist some of the lateral movement of the pneumatic portion of the suspension system, as a unit, it has been found that the bellows per se is subject to undesirable lateral excursions.

It is an object of this invention, therefore, to provide an improved pneumatic air spring apparatus which avoids one or more of the disadvantages of the prior-art arrangements and which reduces complications and improves durability.

In accordance with the invention, the pneumatic spring apparatus of the present invention comprises first and second cylinder means of dissimilar diameters connected by elastomer ring means to provide an air seal. Each of the first and second cylinder means is closed at one of its ends by an end wall. The elastomer ring means interconnecting the sidewalls of the first and second cylinder means are substantially incompressible to forces applied laterally but are yieldable in shear vertically as a result of axial movement between the cyindrical wall portions of said first and second cylinder means.

For better understanding of he present invention together with other and further objects thereof, reference is had to the following description taken in connection with the accompanying drawings and its scope will be pointed out in the appended claims.

In the drawings,

FIG. 1 is a partial side elevation, with parts broken away in section, of a portion of a railway vehicle and its supporting truck at one end;

FIG. 2 is a top plan view of the assembly shown in FIG. 1 with portions of the floor structure of the vehicle body removed;

FIG. 3 is an enlarged transverse section taken along the line 3–3 of FIG. 2.

One corner of a car body **10** is shown as having a side sill structure **11**, a center sill structure **12**, floor beam structure **13**, FIG. 3; and car body bolsters **14**. The bolsters are spaced apart longitudinally.

A railway truck **20** of the same type as that referred to in the above identified application is shown as comprising said frame members **21** supporting a transverse truck bolster **22**. The side frame members are supported at their opposite ends on axles **23**, and wheels **24**. Each wheel has associated therewith a brake assembly indicated by number **25**. The outer side portion of the truck bolster **22** is recessed, FIG. 3, to accept a lower spring support **26** to receive vertically disposed coil spring assembly means **27**. The latter coiled spring means are shown as including a heavy outer coil spring **29** and an inner light coil spring **30** of less diameter than the former. The lower ends of both coil springs **29, 30** rest upon a lower core-flanged positioning plate **31**. A like upper positioning plate **32** rests on the top of the coil springs **29, 30** and carries the improved pneumatic spring means **35** in straight series with said coil spring assembly means **27** therebelow.

The improved pneumatic spring apparatus **35** comprises a top cuplike means **36** and a coaxially aligned bottom cuplike member **37** of smaller diameter than the top member, which are interconnected by means of an elastomeric ring means **39**. The top cut member is shown as including an end wall **40** with downwardly extending generally cylindrical sidewalls **41**, whereas the bottom cup member **37** includes a top end wall **42** with a downwardly extending cylindrical wall **43**. The top wall **42** of the lower cup member carries the aforementioned core-

flanged positioning plate member **32** on its lower surface and supports a solid resilient bumper pad **44** on its upper surface. The generally cyindrical sidewalls **41** of the top cuplike member **36** overlaps the sidewall **43** of the lower cup member **37** to thereby enable the elastomer ring means to seal the space therebetween against air leakage.

In order to provide a suitable source of air supply to the pneumatic suspension means **35** a conduit **47** extends from a fitting **48** opening into a reservoir R formed by the bolster member **22**, to fitting **49** extending through sidewall **41** of the upper cup member at its upper end. The pressure within pneumatic chamber **35** thus formed by the upper and lower cup members and seal **39** may be regulated in a desired manner according to the car loading to maintain fixed or varying floor heights of the car. The means for regulating such pressure is well known in the art and is a usual accessory of air spring installations.

With further specific reference to elastomeric ring means **39**, FIG. 3, it should be noted that the same is of a material composition which enables the same to yield readily in shear vertically as a result of differential telescopic vertical movement of sidewalls **41, 43**. The ring means also have the property of being substantially incompressible as a result of loads applied by the opposed sidewalls in a direction normal to said sidewalls and transverse to the major axis of coil springs **29, 30**. It should be noted further that the latter sidewalls **41, 43** of the pneumatic cup members extend downwardly so that the ring means **39** is located at about midheight of the helical coil springs **35**. Thus under lateral action of the car body **10** relative to the truck **20**, and with the elastomeric ring so located, the ring provides in effect transverse fixity of the air spring due to the incompressibility of the ring and its location along the vertical length of the coil springs **29, 30**. This construction thereby eliminates the need of radius rods in prior art constructions. In the event of loss of air pressure the elastomeric ring **39** will deflect in shear until the resilient bumper pad **44** contacts the upper cup end wall **40**. The vehicle ride will then be according to the characteristics of the mechanical coil spring **29, 30**.

While there has been described what at present is considered to be the preferred embodiment of this invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention and it is therefore aimed in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

I claim:

1. Spring apparatus for supporting a load comprising, pneumatic spring means having first and second container means for enclosing a compressible medium therebetween, each said first and second container means having a sidewall portion and a top wall portion, resilient bumper pad means interposed between the top wall portion of each said first and second container means, the sidewall portion of said first container means being of greater diameter than, and overlapping, the sidewall portion of said second container means, elastomer ring means interconnecting the sidewall portion of said first container means to the sidewall portion of said second container means to provide a seal between said first and second container means, said ring means being substantially incompressible to forces applied normal to the sidewall portions of said first and second container means, said ring means being yieldable in shear as a result of relative axial movement between said sidewall portions of said first and second container means, coil spring means engaging said second container means, said pneumatic spring means, said coil spring means, and said resilient bumper means being arranged in direct series arrangement, said sidewall portion of said first and of second container means encircling said coil spring means, said elastomer ring means being positioned between said sidewall portion of said first member and said sidewall portion of said second member at approximately midheight of said coil spring means.