United States Patent

Dalton et al.

[15] **3,666,290**

[45] **May 30, 1972**

[54] RESILIENT LANDING GEAR FOOT

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[21] Appl. No.: **27,604**

[52] **U.S. Cl.**.....**280/150.5,** 16/42 T, 248/188.5, 248/188.9, 267/153

[51] **Int. Cl.**.....**B60s 9/00**

[58] **Field of Search**.....280/150.5; 248/24, 188.5, 188.8, 248/188.9; 16/42, 42 T; 267/63, 63 A, 153

[56] **References Cited**

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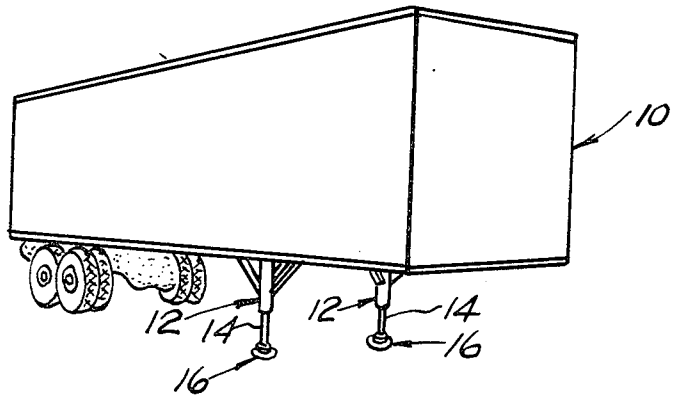
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[57] **ABSTRACT**

A resilient trailer landing gear foot slidably mounted on the lower end of a landing gear leg. The landing gear foot includes a resilient toroid disposed between the lower end of the leg and a ground engaging plate forming a part of the foot for providing resiliency to the foot to absorb shock loading imposed thereon.

10 Claims, 7 Drawing Figures



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SHEET 1 OF 2

FIG. 1

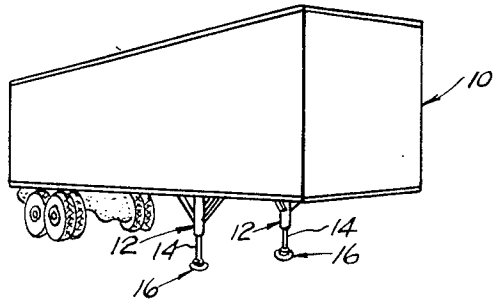
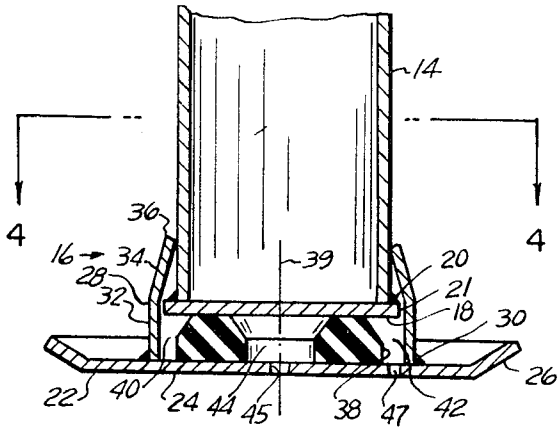


FIG. 2



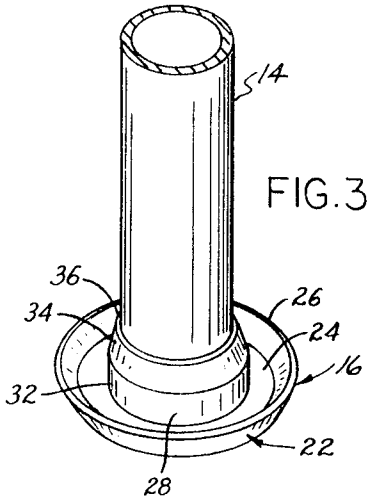


FIG. 3

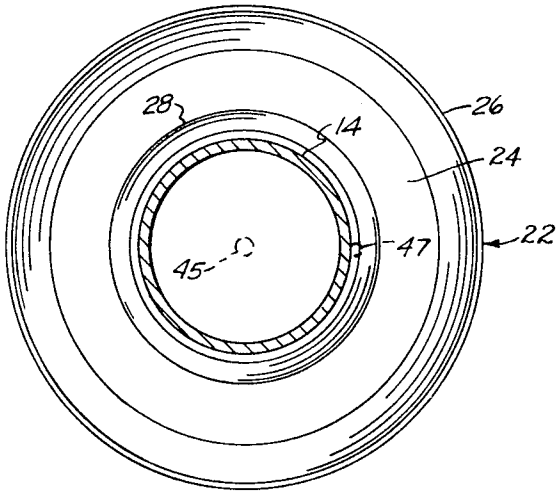


FIG. 4

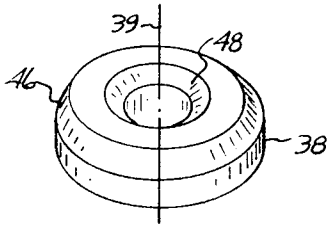


FIG. 5

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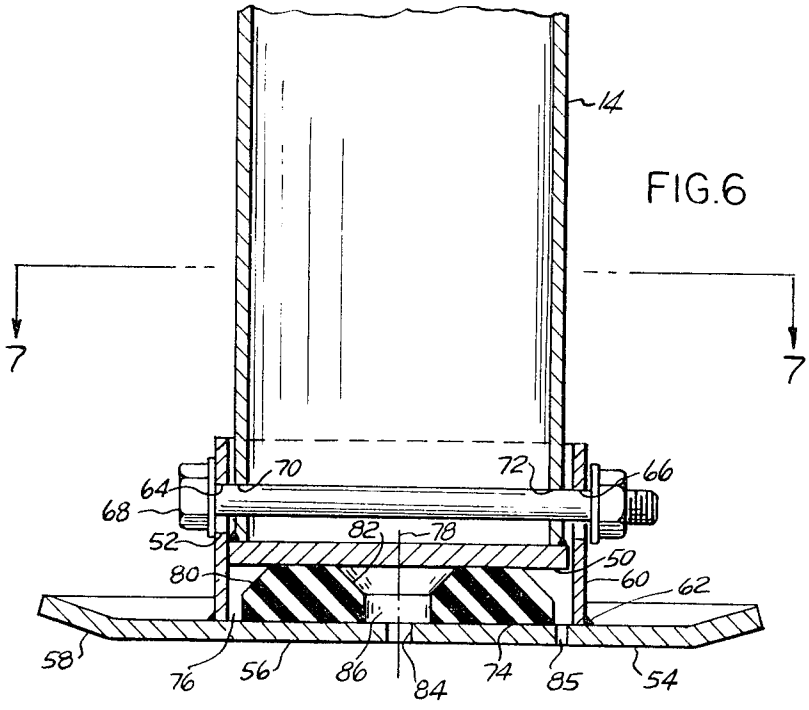


FIG.6

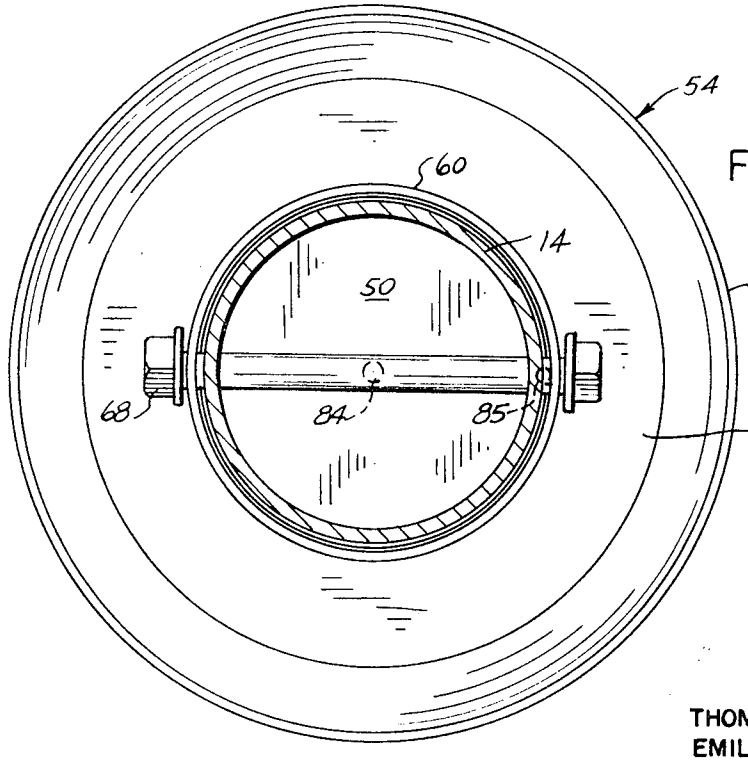


FIG. 7

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RESILIENT LANDING GEAR FOOT

BACKGROUND OF THE INVENTION

1. Field Of The Invention

The present invention relates generally to landing gear for trailers and, more particularly, to the construction of a resilient landing gear foot.

2. Description Of The Prior Art

At the present most of the landing gear for trailers include a pair of legs connected at one end to the trailer. The other end of each leg may have a pair of wheels rotatably mounted thereto. Alternatively, the other end of each leg may have a landing gear foot secured thereto as illustrated in U.S. Pat. No. 3,219,362, issued Nov. 23, 1965 to Oscar Epstein. The foot disclosed in this patent includes a bracket secured to the lower end of the landing gear leg with a plate secured to the lower end of the bracket. A rubber pad is secured with adhesive to the bottom of the plate and a lower plate is secured with adhesive to the bottom of the pad. Thus, the pad is sandwiched between the two plates.

While such a construction does provide a means for cushioning the impact produced as the trailer is dropped on the landing gears there are a number of disadvantages inherent in the construction disclosed in that patent. For instance there is no provision for resisting shear loads, which will be imposed upon the rubber pad and tend to tear it away from the plates. Furthermore, the rubber pad is exposed to oil, dirt and other foreign matter which will shorten its life.

SUMMARY OF THE INVENTION

The resilient landing gear foot of the present invention solves the problems of the prior art by enclosing the resilient member to protect it from foreign matter and by providing the support necessary to absorb shear stresses placed upon the foot. The landing gear includes a leg having one end secured to the trailer and a circular plate secured to its lower end. In one preferred embodiment the plate includes a portion extending radially beyond the outer surface of the leg. A disc shaped plate having a cylindrical bracket secured to the center thereof extends upwardly over the circular plate and the lower end of the leg. In one preferred embodiment the bracket includes an inwardly extending flange formed at its upper end engaging the portion of the circular plate that extends beyond the leg for maintaining the disc shaped plate secured to the leg. In a second preferred embodiment a bolt extends through the bracket and the leg for securing the bracket thereto.

Both embodiments include a resilient toroid disposed within the bracket between the two plates. As the weight of the trailer is placed upon the landing gear, the toroid is compressed between the two plates. If the weight of the trailer is suddenly dropped upon the landing gear, the toroid gradually decreases the downward descent of the trailer as it is compressed between the two plates, thus, reducing the strain placed upon the landing gear by the shock loading. Any shear stresses placed upon the foot are absorbed by the bracket which encloses the resilient toroid to thereby also protect the toroid from foreign matter.

The toroid is preferably chamferred at one end on both its outer and inner edges, thus, giving the toroid an increasing spring rate as it is compressed between the two plates.

DESCRIPTION OF THE DRAWINGS

The description refers to the accompanying drawings wherein like reference characters refer to like parts throughout the several views and in which:

FIG. 1 is a perspective view of a trailer body equipped with pivoted landing gears and feet of the present invention;

FIG. 2 is a cross-sectional view of the resilient landing gear foot shown in FIG. 1;

FIG. 3 is a perspective view of the resilient landing gear foot shown in FIG. 2;

FIG. 4 is a cross-sectional view taken on line 4—4 of FIG. 2;

FIG. 5 is a perspective view of the resilient toroid shown in FIG. 2;

FIG. 6 is a cross-sectional view of a second preferred embodiment of the resilient landing gear foot; and

FIG. 7 is a cross-sectional view taken on line 7—7 of FIG. 6.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, a conventional trailer body, generally indicated at 10, includes a pair of landing gears 12 mounted towards the front thereof. The landing gear 12 which may be of the fixed, pivoted or retractable type, support the trailer body 10 when it is uncoupled from a motorized tractor. Each landing gear 12 includes a leg 14 which may be of any desired cross-sectional shape, but preferably is of a round tubular construction as illustrated. A resilient landing gear foot 16 is secured to the lower end of each of the legs 14.

As shown in FIGS. 1–4, the leg 14, which preferably is substantially vertically disposed while supporting the trailer 10, includes a circular plate 18 (FIG. 2) secured to its lower end as by welding indicated at 20. The plate 18, which is substantially perpendicular to the axis of elongation of the leg 14, preferably has a diameter slightly larger than the outer diameter of the leg 14 so as to form a ring 21 extending radially outwardly beyond the outer surface of the leg 14.

Each resilient foot 16 includes a disc shaped landing plate 22 that is preferably formed with a central circular flat portion 24 and an upwardly extending peripheral flange 26 formed therearound. The foot 16 includes a tubular bracket 28 having its lower end secured to the center of the top surface of the flat portion 24 as by weld 30 (FIG. 2). The bracket 28 has a cylindrical portion 32 extending upwardly from the flat portion 24 of the plate 22 which has an inner diameter slightly larger than the diameter of the circular plate 18 for receiving therein the lower end of the leg 14 and the plate 18. The bracket 28 has an inwardly extending flange 34 forming its upper portion and integral with the cylindrical portion 32. The flange 34 extends inwardly above the plate 18 toward the leg 14 such that its upper edge 36 is adjacent to the outer surface of the leg 14. Thus, the flange 34 engages the ring 21 of the plate 18 for maintaining the resilient foot 16 secured to the leg 14 while permitting a limited amount of relative axial movement between the foot 16 and the leg 14.

As can best be seen in FIG. 2 an elastomer or resilient toroid 38, preferably formed from hard rubber or the like, is disposed within a cylindrical chamber 40 formed by the plate 18, the flat portion 24 and the cylindrical portion 32 and has its central axis 39 substantially parallel to the axis of elongation of the leg 14. The toroid 38 forms the resilient portion of the landing gear foot. When the trailer 10 is uncoupled from a tractor and slowly set on the landing gear 12, the plate 22 engages the ground and the toroid 38 is compressed between the plate 18 and the flat portion 24 as the foot 16 is moved upwardly along the leg 14 to support the weight of the trailer 10. It will be noted that as the plate 18 and the flat portion 24 move closer together, the flange 34 is free to slide further onto the leg 14, thus not inhibiting the relative movement of the plate 18 and the portion 24. When the trailer 10 is uncoupled from a tractor and the weight thereof is suddenly dropped upon the landing gear 12, the toroid 38 cushions the shock imposed upon the foot 16.

The outer diameter of the toroid 38 is slightly less than the inner diameter of the cylindrical member 32, thus, leaving a space 42 therebetween. As the weight of the trailer 10 is placed upon the landing gear 12 compressing the toroid between the plate 18 and flat portion 24, the outer diameter of the toroid 38 becomes larger filling at least a portion of the space 42. Furthermore, the material of the toroid 38 is able to flow into the space 44 provided in the center of the toroid during the compression thereof.

As best shown in FIG. 5 the toroid 38 is preferably chamferred at one end around its outer edge as indicated at 46 and around its inner edge as indicated at 48. By chamferring the edges of the toroid 38 more space is provided within the chamber 40 into which the material of the toroid may flow during the compression thereof. Furthermore, by providing

the chamfer indicated at 46 the toroid 38 may be formed with its outer diameter the same as the inner diameter of the cylindrical portion 32, since the material of the toroid can flow into the space provided by the chamber as at 46 during the compression thereof.

By chamferring the edges as at 46 and 48, the effective spring rate of the toroid 38 increases as the toroid is compressed between the plate 18 and the flat portion 24. Thus, the spring rate of the toroid increases to support more weight as it is compressed. Although the toroid 38 is illustrated with both edges chamferred as at 46 and 48, it will be noted that the toroid may be formed with only one edge chamferred and still have a varying spring rate. Furthermore, as shown in FIG. 2, the cross-section of the toroid 38 shows the chamferred edges as straight slanted lines. It will be noted that the toroid may be chamferred at its inner and outer edges such that in cross-section the chamferred edges would appear as curved lines.

An aperture 45 may be formed in the flat portion 24 in communication with the space 44 for allowing air to escape out of the space 44 when the toroid 38 is compressed. A second aperture 47 may be formed in the flat portion 24 in communication with the space 42 for similar reasons.

It will be noted that in addition to acting as a cushion for the foot 16 the toroid 38 enables the landing gear foot to conform to uneven terrain, providing a better support for the trailer than if a rigid support were provided therefore.

Referring to FIGS. 6 and 7, a second preferred embodiment of the resilient landing gear foot is illustrated. The leg 14, which preferably is substantially vertically disposed while supporting the trailer 10, includes a circular plate 50 secured to its lower end as by welds 52. The plate 50, which is substantially perpendicular to the axis of elongation of the leg 14, preferably has a diameter substantially the same as the outer diameter of the leg 14.

The second embodiment also includes a disc shaped landing plate 54, similar to the plate 52, having a central circular flat portion 56 and an upwardly extending peripheral flange 58 formed therearound. A tubular bracket 60 having a larger inner diameter than the diameter of the plate 50 has its lower end secured to the center of the top surface of the flat portion 56 as by weld 62 (FIG. 6) and extends upwardly therefrom around the plate 50 and the lower portion of the leg 14. The bracket 60 is formed with a pair of opposed vertically disposed elongated slots 64 and 66 adjacent its upper end for receiving a transversely extending bolt 68 therein. The bolt 68 extends through a pair of opposed apertures 70 and 72 formed in the leg 14 adjacent the plate 50 for securing the bracket 60 to the lower end of the leg 14.

As shown in FIG. 6 a resilient toroid 74, similar to toroid 38, is disposed within a cylindrical chamber 76 formed by the plate 50, the flat portion 56 and the tubular bracket 60 and has its central axis 78 substantially parallel to the axis of elongation of the leg 14. The toroid 74 is preferably chamferred at one end around its outer edge as indicated at 80 and around its inner edge as indicated at 82. It will be noted that the construction of the toroid 74 may be modified as indicated previously with respect to the toroid 38.

The operation of the second embodiment is similar to the operation as previously described. As the weight of the trailer 10 is placed upon the leg 14 compressing the toroid 74, the leg 14 moves further into the chamber 76 formed by the bracket 60, moving the bolt 68 downwardly in the slots 64 and 66. Thus, the bracket 60 maintains the landing foot secured to the leg 14, but does not inhibit the relative vertical motion of the leg 14 and the plate 54 during the compression of the toroid 74.

An aperture 84 may be formed in the flat portion 56 in communication with the space 86 provided in the center of the toroid 74 to allow air to escape out of the space 86 when the toroid 74 is compressed. A second aperture 85 may be formed in the flat portion 56 in communication with the chamber 76 for similar reasons.

Thus, a resilient landing gear foot is described for absorbing the shock loading placed upon the landing gear to prevent damage thereto. The foot readily conforms to uneven terrain to provide adequate support for the trailer. The resilient toroid is disposed within the bracket and thus in addition to providing strength to absorb shear stresses also thereby protects the toroid from oil, dirt and other foreign matter that would shorten the life of the toroid.

Although we have described but two preferred embodiments of our invention, it is to be understood that various changes and revisions can be made therein without departing from the spirit of the invention or the scope of the appended claims.

We claim:

1. A landing gear for a vehicle comprising:
a leg;
a plate member secured to the bottom of said leg;
a bracket carried by said leg and movable relative to said leg, said bracket having a wall portion surrounding said leg and extending downwardly below said plate member;
a ground engaging member secured to the lower portion of said bracket wall portion; and
an elastomer member disposed between said plate member and said ground engaging member, the downward movement of said bracket with respect to said leg being limited by the engagement of said wall portion with said plate member, the upward movement of said bracket with respect to said leg being limited by the amount of compression of said elastomer member between said plate member and ground engaging means when said last mentioned member engages the ground, said elastomer member normally being in an uncompressed state when said bracket wall portion is in engagement with said plate member, said elastomer member having an increasing cross-sectional area as taken in successive planes substantially parallel to the plane of said plate member, the spring rate of said elastomer member increasing as said elastomer member is compressed between said plate member and said ground engaging member.

2. The landing gear as defined in claim 1, wherein said elastomer member is a toroid.

3. The landing gear as defined in claim 1, wherein said elastomer member is substantially cylindrically shaped and is disposed between said plate member and said ground engaging member with its axis of elongation substantially parallel to the axis of elongation of said leg.

4. The landing gear as defined in claim 3, wherein said elastomer member is chamferred at one end around its outer edge.

5. The landing gear as defined in claim 4, wherein said elastomer member has an aperture formed therethrough with its axis of elongation substantially parallel to the axis of elongation of said leg.

6. The landing gear as defined in claim 5, wherein said aperture includes a cylindrical portion and a cone shaped portion increasing the diameter of said aperture at the chamferred end of said elastomer member.

7. The landing gear as defined in claim 1, wherein a portion of said plate member extends laterally beyond said leg, and said bracket wall portion engages said laterally extending portion of said plate member for limiting the downward movement of said bracket with respect to said leg.

8. The landing gear as defined in claim 1, wherein said leg includes a tubular portion forming its lower end, and said plate member is disc shaped with a diameter larger than the outer diameter of said leg.

9. The landing gear as defined in claim 8, wherein said bracket includes a tubular portion having its lower end secured to said ground engaging member and an annular flange extending inwardly from the upper end of said tubular portion, said plate member being disposed within said bracket and engaging said flange for limiting the downward movement of said bracket with respect to said leg.

10. A landing gear for a vehicle comprising:

a leg;
a plate member secured to the bottom of said leg;
a bracket movably secured to the bottom portion of said leg and extending downwardly past said plate;
a ground engaging member secured to the lower portion of said bracket; and
a resilient member having a substantially cylindrical shape and chamfered at one end around its outer edge and having an aperture formed therethrough with its axis of elongation substantially parallel to the axis of elongation of said leg, said aperture including a cylindrical portion and a cone-shaped portion increasing the diameter of said aperture at the chamfered end of said resilient member, the spring rate of said resilient member increasing as said resilient member is compressed between said plate and said ground engaging member.

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