

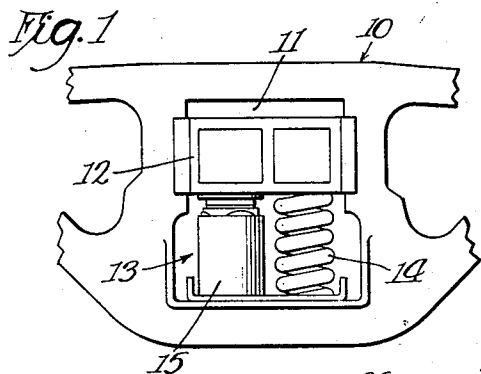
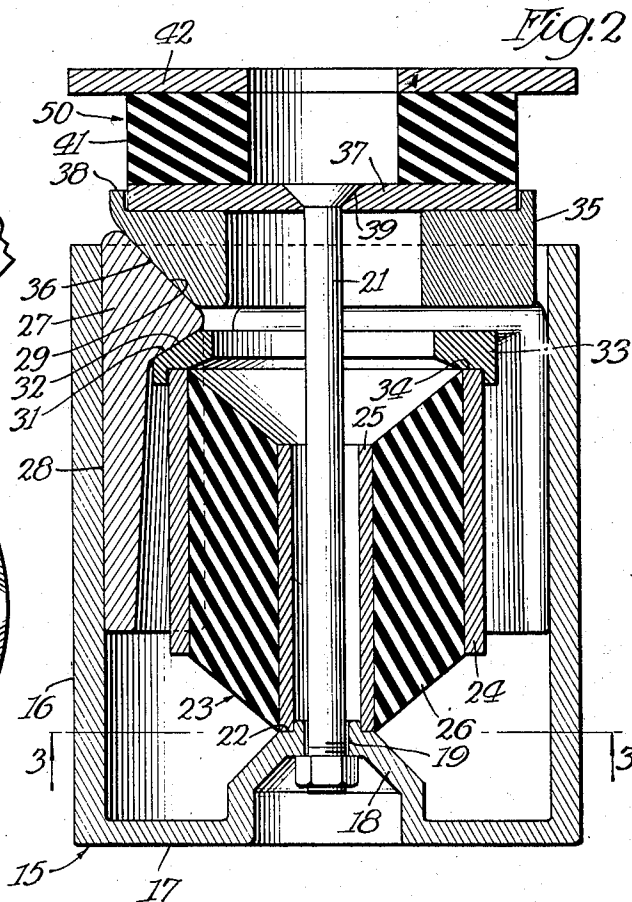
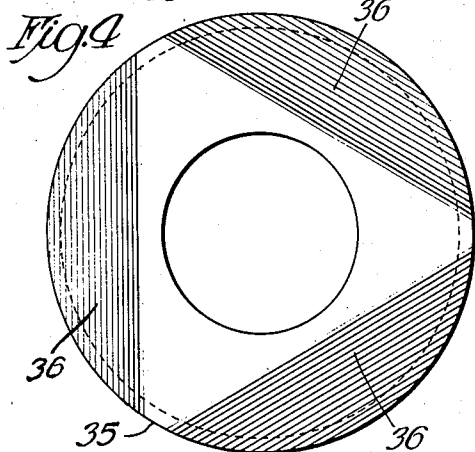
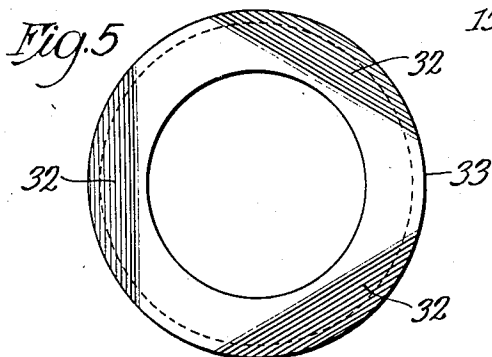
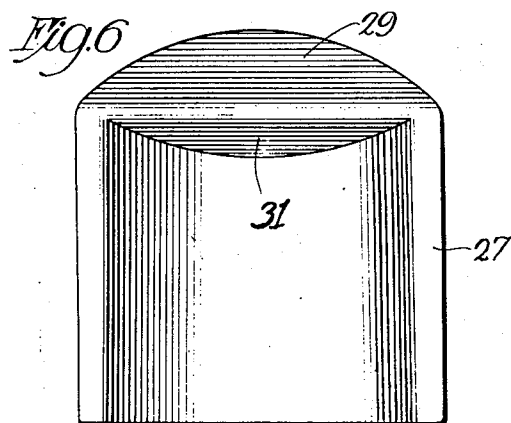
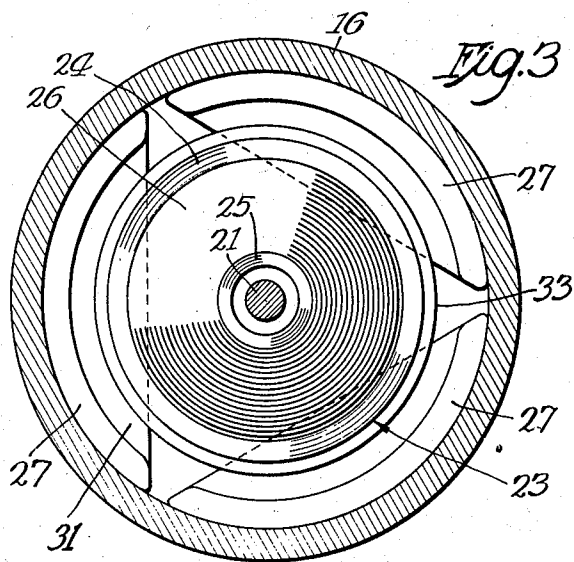
June 20, 1944.

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2,352,030

BOLSTER SPRING UNIT

Original Filed April 8, 1938



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UNITED STATES PATENT OFFICE

2,352,030

BOLSTER SPRING UNIT

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Continuation of application Serial No. 200,841,
April 8, 1938. This application April 8, 1940,
Serial No. 328,559

11 Claims. (Cl. 267—9)

This invention relates to spring assemblies, and more particularly to resilient units for use in connection with the bolster supporting spring assemblies of railway cars.

One of the objects of the invention is the provision of a new and improved resilient unit having associated therewith rubber elements and friction mechanism for resiliently supporting a load and for absorbing shocks incident to the travel of the car over the rails that are transmitted to said unit.

A further object of the invention is the provision of a new and improved spring unit that is provided with friction mechanism for increasing the capacity of the unit and for preventing harmonic action together with rubber elements so arranged as to absorb tremors or vibrations of small amplitude as well as cushioning vibrations of greater amplitude.

Another object of the invention is the provision of a new and improved spring unit employing rubber under both compression and shear for resisting the vertical movement of the truck bolster and for absorbing shocks incident to the travel of the truck on which the unit is employed.

A still further object of the invention is the provision of a new and improved bolster supporting resilient unit that is provided with friction wedges for increasing the capacity of the unit and for preventing harmonic action together with rubber means engaging one of the following adapted to be distorted upon compression of the gear for causing increased frictional resistance to the movement of the friction wedges.

Another object of the invention is the provision of a new and improved resilient unit for use in railway trucks that is simple in construction, composed of few moving parts, and that is efficient in operation.

Other and further objects and advantages of the invention will appear from the following description, taken in connection with the accompanying drawing, in which—

Fig. 1 is a side elevation of a railway truck showing the invention in position therein, with parts broken away;

Fig. 2 is a vertical section of the spring unit;

Fig. 3 is a section on the line 3—3 of Fig. 2;

Fig. 4 is a bottom plan view of one of the annular wedges;

Fig. 5 is a top plan view of the other annular wedge; and

Fig. 6 is a front elevation of one of the wedge members.

Referring now to the drawing, the reference character 10 designates the side frame of a railway car having the bolster opening 11 therein with a bolster 12 extending into the opening. The bolster is supported by a spring assembly 13

comprising the helical springs 14 of the conventional size and construction and the resilient unit 15 of novel construction.

The unit 15 comprises a hollow base member, plate or follower 16 open at its upper end and having its base or bottom wall 17 provided with an inwardly extending or depressed portion 18 at the central portion thereof. The follower 15 may be considered as a cup-shaped member having a base or bottom wall 17 and a cylindrical flange or side wall extending upwardly or toward the opposite follower, or follower member 35. The depressed portion 18 is provided with an axial opening 19 for the reception of a bolt 21 extending axially of the base member 16 and adapted to hold the parts in assembled relation under initial compression, if desired.

The depressed portion 18 is provided with a circular rabbet 22 constituting a seat for a resilient element 23. The resilient element 23 comprises an outer tubular member 24 on which is seated parts of the friction mechanism, as will presently appear, and an inner concentric tubular member 25 seated in the rabbet 22 and spaced from the tubular member 24 and having a cylindrical block of rubber 26 occupying said space and vulcanized to the tubular members 24 and 25. Preferably, but not necessarily, the inner tubular member 25 is displaced axially downwardly relative to the tubular member 24. The parts are so constructed that when a load is applied to the outer tubular member 24 through the friction mechanism, the rubber 26, which is in contact with the follower 15, will be placed under shear and will be distorted or bulged downwardly as the unit is compressed. As more and more of the bulged or distorted portion of the rubber engages the member 18 as the sleeve 24 moves downward under load, the greater becomes the resistance to further distortion of the rubber so that by the time the compressive force applied to the unit is sufficient to cause the sleeve 24 to engage the bottom wall 17, the resistance offered by the distorted rubber will almost equal such compressive force with the result that there will be little or no shock when the sleeve 24 contacts the bottom wall 17 of the follower 15.

Suitable means are provided for frictionally engaging the inner walls of the base member or follower 15. As shown, the friction mechanism is employed for this purpose. This mechanism comprises friction shoes and wedging means. The former comprises a plurality of shoes 27 having an outer friction face 28 corresponding to the curvature of the follower 16. In the form of the device selected to illustrate one embodiment of the invention, a plurality of these wedges are employed, three being shown, each extending substantially 120° around the inner surface of the follower 16.

Appropriate wedging means are provided for forcing the shoes into frictional contact with the inner surface of the follower. Each shoe 27 is provided with a flat inclined surface 29 facing outwardly and a flat inclined wedging surface 31 facing inwardly. The wedging faces 31 are adapted to engage corresponding inclined wedging faces 32 of an inner annular or ring wedge member 33 which is seated on the tubular member 24, as clearly shown in Fig. 2 of the drawing. If desired, the ring wedge member 33 may be provided with a rabbet 34 for receiving the upper end of the cylinder 24 for preventing radial displacement of the latter. An upper follower member or outer ring wedge member 35 having inclined flat wedging faces 36 is adapted to seat on and frictionally engage the inclined flat faces 29 of the shoes 27. A cap plate 37 is seated on the follower member 35, and, if desired, an annular flange 38 is provided on the outer periphery of the follower member 35 for positioning the cap plate 37. The cap plate 37 is provided with an axial opening 39 for receiving the headed end of the bolt 21 for holding the parts in assembled relation.

In the travel of railway trucks, there is normally a continuous vibration of the different parts of the truck incident to the movement of the wheels over the rails. These vibrations are normally of small amplitude but in the event the road bed is not level or the wheels are not perfectly round, the truck bolster is subjected to vibrations of greater amplitude.

Suitable means are provided for absorbing a greater portion of the vibrations of smaller amplitude that would otherwise be transferred to the bolster. In the form of the construction selected to illustrate one embodiment of the invention, this is accomplished by providing one or more annular blocks of rubber inserted between the cap member 37 and the bolster. In the form of the construction shown, rubber means comprising a single annular block of rubber or rubber element 41 is provided for this purpose. The rubber is inserted between the cap member 37 and a supporting plate 42. The follower plate 42, rubber element 43, cap plate 37, and follower member 35 constitute what may be termed a follower assembly 50. The supporting plate 42 may be in the form of an annular member and the rubber block 41 is preferably, though not necessarily, vulcanized to the cap plate 37 and supporting plate 42. The overall length of the unit from the plate 42 to the bottom of the follower 17 is substantially that of the conventional bolster supporting spring and is substantially the same diameter. In practice, one or more of these units are substituted in each spring assembly for one or more of the conventional bolster springs.

It will be noted that the parts, while supporting a static load, are of such construction that both blocks are initially distorted, the rubber block 41 being under compression while the rubber block 26 is under shear. These blocks are so constructed and arranged that the capacity of the block 41 is much higher than that of the block 26. As one example, the block 41 may have a deflection of $\frac{1}{8}$ inch for a weight of 11,000 lbs. applied to the plate 42 while the block 26 will have a deflection of $1\frac{1}{2}$ inches for a weight of 1,100 lbs. applied to the upper end of the tubular member 24.

When a steadily increasing downward force is applied to the unit, the block 41 will continue to be compressed until the force is sufficient to overcome the combined frictional resistance of the

shoes and the resistance of the block 26 to further shear.

Vibrations of large amplitude will exceed this point and cause movement of the shoes. During this movement, the block 41 will continue to be compressed but its compressive movement is so small as compared with the movement of the shoes or block 26 that this larger shock is absorbed principally by the block 26. But even during these vibrations of greater amplitude and of comparatively low frequency, say from 200 to 250 per minute by way of example, there are vibrations of small amplitude and high frequency that effect the unit. These vibrations are caused by the movement of the car and consequent vibration of the all steel construction of the parts. These vibrations may be as high as from two thousand to three thousand per minute. The shoes, of course, will not respond to vibrations of such frequency and hence, at all times, these high frequency vibrations will be absorbed principally by the block 41, even during the movement of the shoes.

It will thus be seen that in the operation of the device, the vibrations of smaller amplitude will be absorbed by both blocks, principally by the block 41 since the whole load is supported by this block while the shocks of greater amplitude will also be absorbed by both blocks but principally by the block 26. The weight of the car will tend to compress the rubber block 41 and will also tend to force the shoes 27 outwardly into frictional engagement with the inner walls of the follower member 15 and as the shoes 27 are moved downwardly, they will force the sleeve 24 downwardly for placing the rubber block 26 under shear. The wedge members 33 and 35 will tend to force the shoes outwardly to a greater extent as the compressive force is applied thereby creating greater friction between the shoes and the inner wall of the follower member for resisting this compression.

It will thus be seen that while the rubber block 41 must support the entire load transmitted to the unit, the friction mechanism relieves the block 26 of a large part of the load. In other words, the compressive force operates first through the block 41 and then divides, a part operating through the block 26 and the remainder through the wedging mechanism. For this reason, the block 41 may be considered as being in series with the combined friction mechanism in the block 26 whereas the block 26 is in parallel with the friction mechanism in supporting the load. Upon release, the resiliency of the rubber blocks will restore the parts to their normal position.

This is a continuation of my application, Serial No. 200,841, filed April 8, 1938.

It is thought from the foregoing, taken in connection with the accompanying drawing, that the construction and operation of my device will be apparent to those skilled in the art and that changes in size, shape, proportion and details of construction may be made without departing from the spirit and scope of the appended claims.

I claim as my invention:

1. In a shock absorbing unit, a chambered follower, a top plate, a cylindrical member resting on the base of said follower, a second cylindrical member concentric with the first-named member and elevated relative thereto and adapted to be engaged by said top plate, an annular rubber element between said members and vulcanized thereto, friction and wedging members between

said plate and follower, said members comprising friction shoes, means on said shoes for engaging said plate for resisting the inward movement of said shoes, and a wedge member engaging said shoes for forcing the same radially outwardly into frictional engagement with the inner walls of said follower and for forcing said shoes inwardly longitudinally of said chambered follower.

2. In a shock absorbing unit, a base member, a top member, a block of rubber under compression on said top member, a mass of rubber under shear between said members, and friction and wedging mechanism between said top and base member operating in parallel with said mass of rubber.

3. In a spring assembly for railway car trucks, a chambered base member, a rubber unit comprising an outer cylinder, an inner cylinder coaxial with said outer cylinder and displaced downwardly therefrom, a rubber cylindrical member vulcanized to said cylinders, said inner cylinder seated on the bottom wall of said base member, an annular wedge member seated on said outer cylinder, friction shoes engaging the inner wall of said base member and having inclined faces engaged by said wedge member, an outer wedge member engaging an inclined face on each of said shoes, and a follower, including a rubber element, engaging said outer wedge member, whereby when said unit is compressed, said rubber element will be placed under shear.

4. In a resilient unit for a railway spring assembly, a chambered follower, friction shoes engaging said follower, said shoes having inwardly and outwardly facing inclined wedging surfaces, two sets of wedging elements engaging said surfaces, rubber means under shear interposed between said follower and one set of said wedges, and follower means engaging the other set of said wedges, said follower means comprising a cap plate, a follower plate and a rubber element between said plates adapted to be placed under compression when said unit is compressed.

5. In a bolster spring unit, a chambered follower, a follower member, friction means engaging said chambered follower, wedge mechanism for forcing said means into frictional engagement with said follower, means including rubber under initial shear for resisting the inward movement of said wedge mechanism longitudinally of said unit, and rubber under compression for supporting a load applied to said unit, said rubber under compression absorbing shocks that do not cause said friction means to move.

6. In a resilient unit for use in a spring assembly for railway cars, a chambered follower, shoes for frictionally engaging the inner surface of said follower, said shoes having wedging surfaces, means for yieldingly resisting the inward movement of said shoes longitudinally of said follower, said means comprising a cylinder engaging the bottom wall of said follower, a second cylinder offset upwardly above the first-named cylinder, a rubber block between said cylinders and vulcanized thereto, a wedge element between said shoes and said second cylinder engaging certain of said wedging surfaces, and a wedge member engaging the remainder of said wedging surfaces for forcing the same inwardly upon the compression of said unit thereby placing said rubber under shear.

7. In a resilient unit for use in a spring assembly for railway cars, a chambered follower, shoes

for frictionally engaging the inner surface of said follower, means for yieldingly resisting the inward movement of said shoes longitudinally of said follower, said means comprising a cylinder engaging the bottom wall of said follower, a second cylinder offset upwardly above the first-named cylinder, a rubber block between said cylinders and vulcanized thereto, a wedge element between said shoes and said second cylinder, a wedge member engaging said shoes for forcing the same inwardly and radially outwardly upon the compression of said unit thereby placing said rubber under shear, follower means engaging said wedge member for compressing said unit when weight is applied to said follower means, said last-named means comprising a pair of plates, and a rubber element under compression between said plates for absorbing shocks of short amplitude, said rubber block being placed under shear during the operation of said unit for resisting the inward movements of said shoes for absorbing shocks of greater amplitude, said rubber element and block cooperating to prevent the conduction of sound vibrations from the truck to the body of said car.

8. In a resilient unit for use in a spring assembly of a railway truck, a chambered follower having its end wall depressed, a rubber unit comprising an inner tube seated on said depression, an outer tube, a rubber member vulcanized to said tubes, follower means comprising a cap member, a follower plate and a rubber block between said cap and plate and vulcanized thereto, and wedging and friction mechanism between said outer tube and follower means and frictionally engaging the interior wall of said chambered follower when said unit is compressed, whereby when said resilient unit is compressed, said rubber block will be under compression and said rubber member will be under shear.

9. In a spring assembly for car trucks, a resilient unit comprising a chambered follower, shoes frictionally engaging said follower, said shoes having wedge shaped friction surfaces, wedge means engaging said surfaces, rubber means for resisting the inward movement of said wedge means for urging said shoes radially outwardly into frictional contact with said follower when the unit is compressed, and means for placing said rubber means under shear when said unit is compressed.

10. In a frictional device, follower members and friction shoes having complementary engaging surfaces in slidable engagement with each other and a single resilient element between all of said members and initially distorted in normal position and further distortable therebetween as said device is compressed under load, said resilient element being a rubber member engaging at least one of said followers.

11. In a friction bolster supporting unit, follower members, side wedge members engaging said follower members and being free to slide thereon, and means between said side wedge members and engaging at least one of said follower members for yieldingly resisting the compression of the unit, said means including a rubber block distortable on compressing said unit and constituting the sole resilient means for restoring said wedge members and followers to normal relative position after release.

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