Nov. 16, 1937. D. F. SPROUL 2,099,240

BOLSTER SUPPORTING UNIT

Filed Dec. 31, 1934

Fig. 1

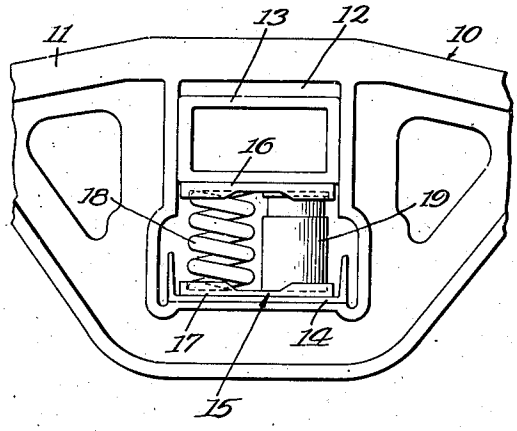


Fig. 3

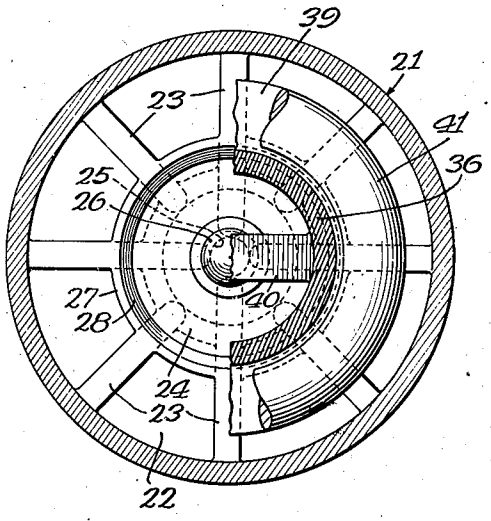


Fig. 2

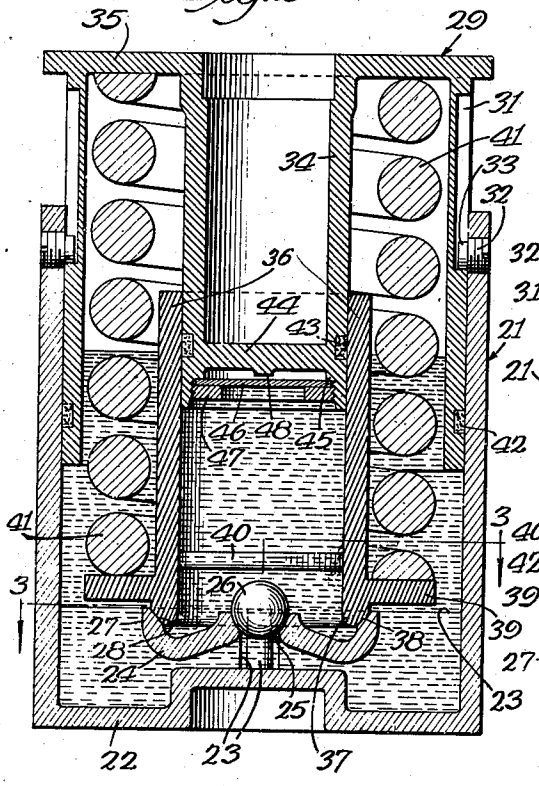
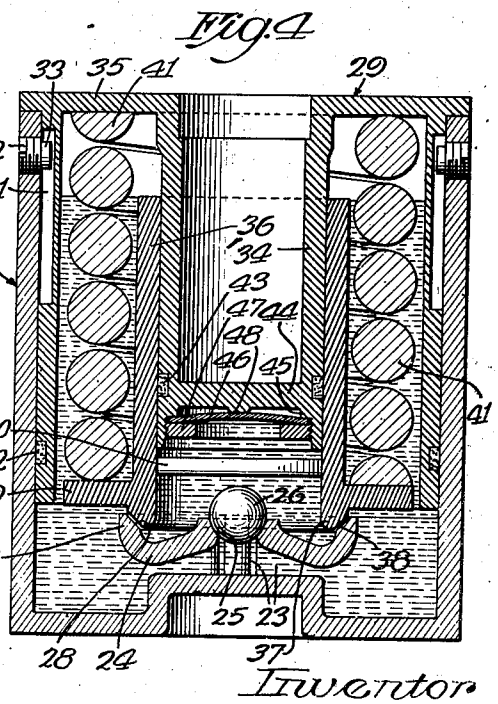


Fig. 4



Inventor
Donald F. Sproul
By Gillson, Mann & Gillson
Attys

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2,099,240

BOLSTER SUPPORTING UNIT

Donald F. Sproul, Chicago, Ill., assignor to Cardwell-Westinghouse Company, a corporation of Delaware

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9 Claims. (Cl. 267—4)

This invention relates to spring units, and, more particularly, to a bolster supporting spring member.

One of the objects of the invention is the provision of a new and improved spring unit having novel means for resisting the compression of the unit.

Another object of the invention is the provision of a new and improved spring unit having novel means for preventing harmonic vibration of the unit in use.

A further object of the invention is the provision of a new and improved spring unit of the dimensions of a conventional helical railway bolster spring but with greatly increased capacity.

Another object of the invention is the provision of a spring unit adapted for supporting a railway bolster that is simple in construction, efficient in operation, that is adapted to be substituted for a conventional helical bolster spring and which is not likely to become broken or get out-of-repair.

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 with parts broken away and parts omitted for the sake of clearness;

Fig. 2 is a vertical section of the bolster supporting unit;

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

Fig. 4 is a section similar to Fig. 3 but showing the unit compressed.

In spring suspension for railway freight cars, it is common practice to employ a spring assembly of helical springs for supporting each end of the bolster from the truck frame. The helical type of spring is eminently satisfactory so far as its function of resiliently supporting the weight of the car is concerned, but it has the disadvantage that it is subject to harmonic vibration. In other words, under certain conditions, as when the ends of the rails become slightly elevated or depressed or where the wheels have flat portions on their peripheries or treads, and the speed is such as to cause the movement of the wheels over these rail joints or the rotation of the flat portions on the peripheries of the wheels to synchronize with the periodic vibration of the spring assembly, the vibrations will build up to such an extent that the car if heavily loaded may damage the springs by causing them to go solid and in doing so to break or otherwise injure the frame. Instances are known where this harmonic vibration has built up to such an extent as to cause the car to become derailed. Furthermore, the building of freight cars with progressively increasing sizes and weights has necessitated the use of springs of greater and greater capacities. But the small space allotted to the springs by car builders creates a serious problem for the spring designer to provide the desired spring capacity in the required space.

The present invention is designed to overcome these difficulties by providing a spring unit that may be substituted for one or more of the helicals in a conventional bolster supporting spring assembly, that has the desired capacity and is provided with novel means for preventing harmonic action of the assembly.

Referring now to the drawing, the reference character 10 designates a portion of a railway truck 12 comprising a side frame 11 having a bolster opening therein through which the end of the bolster 13 extends. A spring plank 14 extends through the opening and a spring assembly designated generally by the reference character 15 is inserted beneath the bolster and rests on the spring plank for resiliently supporting the bolster. Since the specific construction of the side frame and bolster constitute no part of the present invention, it is not thought necessary to further illustrate or describe the same. The spring assembly 15 comprises upper and lower spring plates 16 and 17 between which are helical springs 18, one of which is shown in Fig. 1, and one or more spring units 19. The spring unit 19 is so designed as to increase the capacity of the spring assembly and prevent harmonic vibration thereof.

In the form of the device shown, a cylinder 21 is provided having a bottom wall or base 22 which is preferably circular and provided with upwardly extending fins or ribs 23 that may be, and preferably are, integral with both the base and side of the cylinder. The inner ends of the ribs 23 are integral with a circular plate 24 which has an axial opening 25 therethrough. The upper portion of the plate about the opening is beveled to constitute a valve seat for a ball valve 26. The plate 24 is concave and is provided with an upwardly extending peripheral portion 27 which is beveled on its inner edge, as at 28, to form a valve seat, as will presently appear.

A hollow piston 29 is fitted within the cylinder 21. This piston constitutes the supporting portion of the unit and telescopes within the cylinder 21. Suitable means are provided for limiting the outward movement of the piston relative to

the cylinder. In the form of construction shown, the piston is provided with a plurality of peripheral grooves 31 extending longitudinally of the cylinder wall and a set screw 32 secured in the upper end of the cylinder 21 and provided with a projection 33 engaging in the groove 31 is adapted to prevent withdrawal of the piston from the cylinder. The piston 29 is provided with an auxiliary piston 34 which extends downwardly axially of the base or supporting end wall 35 of the piston 29. This piston is adapted to telescope into an auxiliary cylinder or valve member 36, the lower end of which is provided with an extension 37 having a beveled surface 38 for seating on the bevelled surface 26 of the plate 24. The extension 37 overhangs or projects inwardly beyond the inner edge of the upwardly extending portion 27. The auxiliary cylinder 36 is provided adjacent its lower end with a flange 39 which constitutes a seat for a spring 41 which encircles the sleeve 36 and engages the top plate 35. This spring is adapted to return the parts to extended position after compression. The piston 29 and the auxiliary piston 34 are provided with suitable piston rings or packing 42 and 43, respectively.

When the parts are assembled, the cylinder 21 is partially filled with a liquid, preferably above the level of the diaphragm 46 when the unit is in extended position, and in the operation of the device when the unit is compressed, the liquid in the auxiliary cylinder or valve member 36 will be forced downwardly by the auxiliary piston 34 and this hydraulic pressure operating on the overhanging extension 37 will elevate the member 36 against the tension of the spring 41, permitting the escape of the liquid from the auxiliary cylinder or valve member 36 into the main cylinder 21.

The capacity of the units may be varied by varying the dimensions of the overhanging extensions 37. If the parts are so constructed that the part 37 overhangs the valve seat to a greater extent than as shown on the drawing, the capacity of the unit will be less than the unit shown and vice versa.

When it is desired to increase the capacity of the spring assembly, it may be done in one of two ways, either by substituting additional units for the helicals or by employing units in which the overhanging extension 37 is reduced.

Suitable means are provided for cushioning the initial compressive forces which may be received on the plate 35 while in service. Any suitable mechanism may be employed for this service. In the form of construction shown, a spring plate is used. As shown in Figs. 2 and 3, the piston 34, which is provided with a bottom wall 44, has its side wall extended downwardly beyond said wall and provided with an annular shoulder 45 against which a spring plate 46 is clamped, as by means of the annular clamping member 47.

In operation, a downward thrust movement of the auxiliary cylinder 34 will be initially cushioned by the resilience of the plate 46 which is permitted a slight movement before it comes in contact with the projection or seat 48 on the bottom wall 44 of the piston 34.

The parts are so arranged and proportioned that slightly before or simultaneously with the seating of the plate 46 on the projection 48 the valve member 36 will rise to permit the escape of the liquid into the outer cylinder. Upon rebound the valve member 36 will seat and the liquid will be returned by suction and gravity past the valve 26 into the inner cylinder or valve member 36. A bar 49 within the sleeve member 36 limits the upward movement of the valve and retains it in proper position.

In practice, one or more of the conventional helical springs are replaced by one or more of the units and in order to properly equalize the resistance to the downward movement of the bolster and prevent turning of the same, the units are symmetrically arranged. For instance, if only two of the units are employed for each bolster, one is located at the end of the bolster on the forward side, and the other at the opposite end of the bolster on the rear side.

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 spring suspension for railway cars, a main cylinder for containing a liquid, an auxiliary cylinder within said main cylinder and containing a liquid, a spring surrounding said auxiliary cylinder and adapted to assist in supporting a car, and means including said spring for controlling the transference of liquid from said auxiliary to said main cylinder upon compression of said unit.

2. In a spring unit for railway car spring suspension, a primary cylinder adapted to contain a liquid, said cylinder having a closed lower end provided with a plate member held in spaced relation to the bottom and side walls of the said plate having an axial opening and a valve seat on its peripheral edge, a hollow piston, an open-ended cylinder within said primary cylinder having an extension on one end engaging said seat and overhanging the same, a spring for resisting the movement of said piston and the unseating of said open-ended cylinder and an inner piston for said last-named cylinder movable with said first-named piston.

3. In a spring unit for railway car spring suspension, a primary cylinder adapted to contain a liquid, said cylinder having a closed lower end provided with a plate member held in spaced relation to the bottom and side walls of the said plate having an axial opening and a valve seat on its peripheral edge, a hollow piston, an open-ended cylinder within said primary cylinder having an extension on one end engaging said seat and overhanging the same, a spring for resisting the movement of said piston and the unseating of said open-ended cylinder, and a resilient metal plate carried by said hollow piston for cushioning the initial compressive forces delivered to said unit.

4. A spring unit for car spring suspension, comprising a pair of telescopic members adapted to contain a liquid, a pair of telescopic elements within said members adapted to contain a liquid, one of said members having a valve seat on which one of said elements is adapted to seat, and a spring for yieldingly resisting the compression of said unit and the unseating of said element.

5. A spring unit comprising a pair of telescopic members, a pair of elements defining a space within said members for containing a liquid, said space being at its maximum when said members are extended and at its minimum when they are compressed, means including one of said elements

for controlling the flow of liquid from said elements into said members when said unit is compressed, and a valved passage through which said liquid is returned when said unit is expanded.

6. A spring unit comprising compressible members adapted to contain a liquid, compressible means within said members adapted to contain a liquid and to be compressed for discharging liquid therefrom into said members when said unit is compressed, and means including a spring for controlling the flow of liquid from said compressible means to said members when said unit is compressed, said spring returning said members to extended position after compression.

7. In a spring suspension for railway cars, a spring unit comprising a reservoir, a cylinder movable relative to said reservoir and adapted to receive a liquid therefrom when the unit expands, a piston for said cylinder, a resilient supporting member for resisting the compression of said unit, means including said cylinder for placing said reservoir in communication with said cylinder for receiving liquid from the cylinder when said unit is compressed, and hydraulic mechanism comprising a valve controlled by said member for resisting the compression of said unit.

8. In a railway car, a truck frame, a truck bolster, a spring assembly for supporting said bolster from said frame, said assembly comprising helical springs and a spring unit operating in parallel, said unit comprising hydraulic mechanism and a resilient supporting member, said mechanism including a cylinder, a reservoir surrounding said cylinder and containing a fluid, a pressure valve and a check valve of restricted area for controlling the flow of said fluid between said reservoir and cylinder for dampening both the compression and expansion movement of said unit.

9. A spring unit for railway car spring suspension, comprising a resilient supporting member and hydraulic mechanism for controlling the compression of said unit, said mechanism comprising a cylinder for containing a liquid, a piston for said cylinder, said piston having an imperforate resilient disk on the end contacting said liquid for cushioning the sudden compression movement of said piston, and means for engaging the central portion of said disk for limiting its inward flexing movement.

DONALD F. SPROUL.