Feb. 22, 1944. D. F. SPROUL 2,342,499

FRICTION SPRING UNIT FOR RAILWAY TRUCKS

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Fig. 1

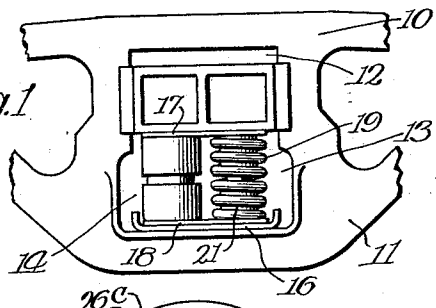


Fig. 2

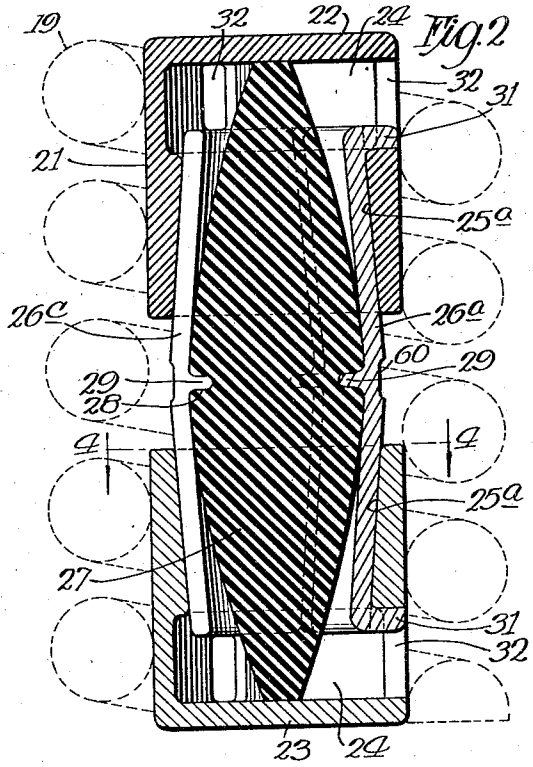


Fig. 4

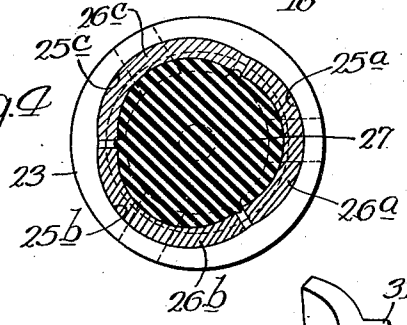


Fig. 5

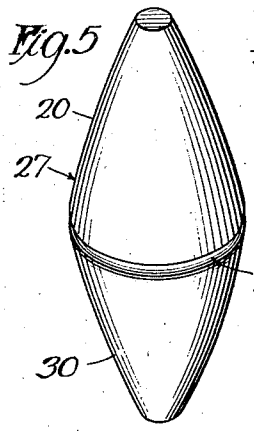


Fig. 6

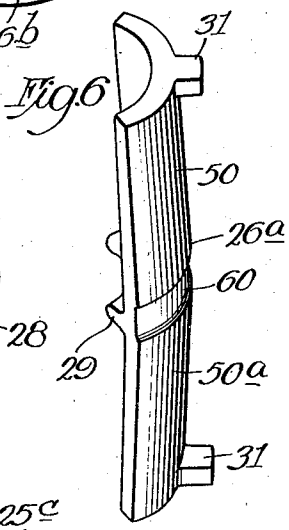


Fig. 3

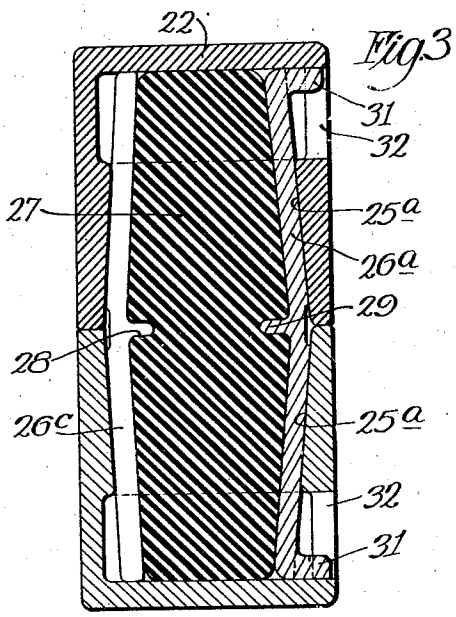
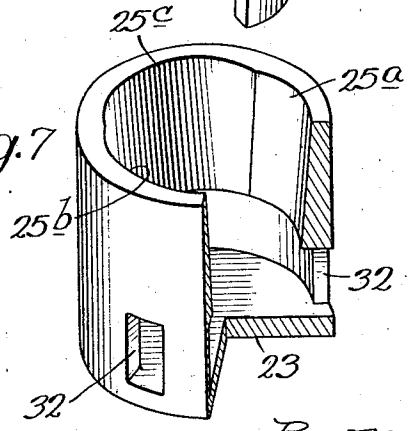


Fig. 7



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Fig. 10

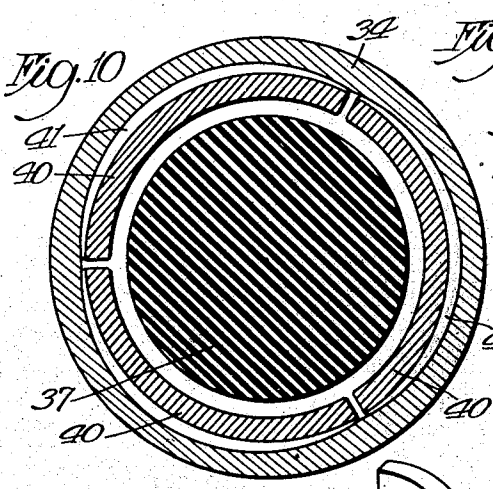


Fig. 8

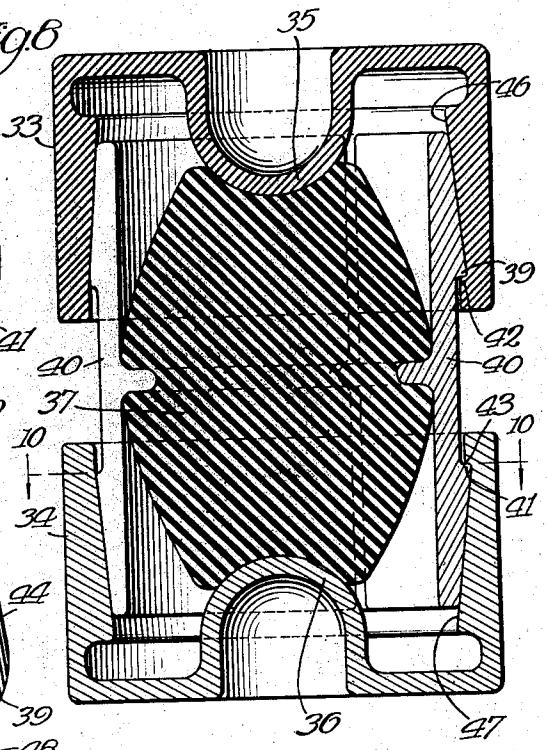


Fig. 11

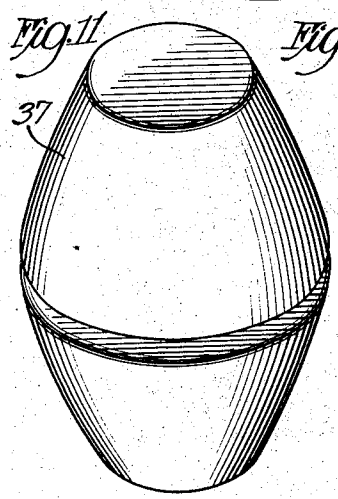


Fig. 12

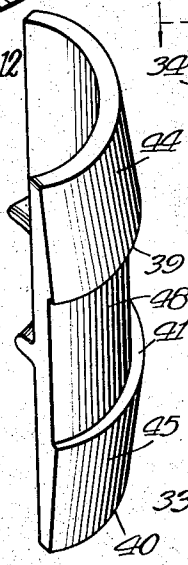


Fig. 9

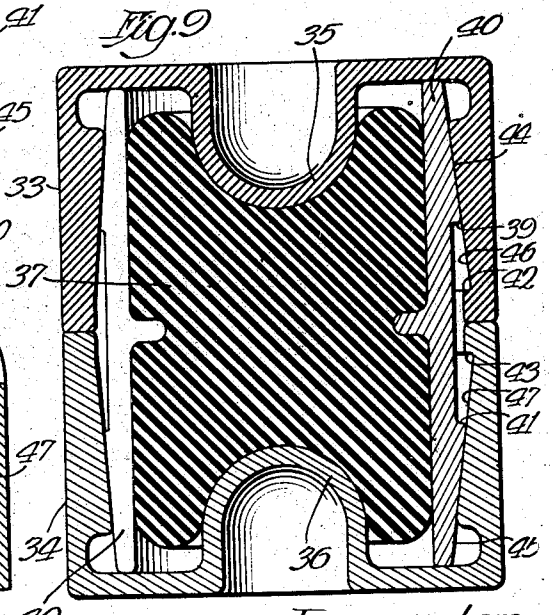
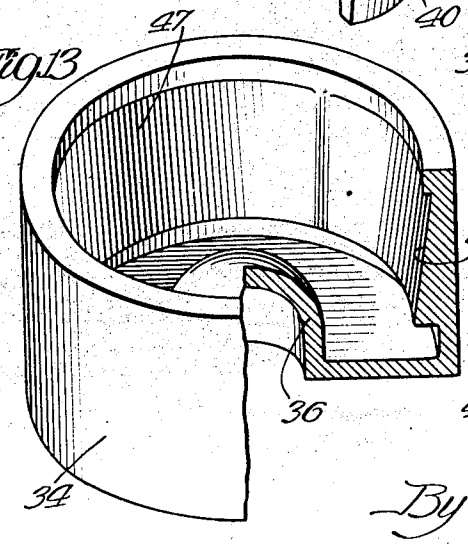


Fig. 13



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2,342,499

FRICTION SPRING UNIT FOR RAILWAY TRUCKS

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Application March 16, 1939, Serial No. 262,220

8 Claims. (Cl. 267—9)

This invention relates to bolster supporting spring or resilient units for railway cars, and, more especially, for use in bolster supporting spring assemblies.

One of the objects of the invention is the provision of a new and improved resilient unit having its resilient element of rubber or of similar material.

Another object of the invention is the provision of a new and improved bolster supporting unit having a resilient element of such material that it will not develop harmonic action during its use.

A further object of the invention is the provision of a new and improved bolster supporting unit that is adapted to dampen the vertical vibration of the spring assembly and to more efficiently absorb shocks of small amplitude.

A still further object of the invention is the provision of a new and improved spring unit that is simple in construction, efficient in use, that may be readily installed and that may be manufactured at a reasonable cost.

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

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

Fig. 2 is a vertical section of the unit, showing the same in expanded position;

Fig. 3 is a similar view but showing the unit in compressed position;

Fig. 4 is a section along the line 4—4 of Fig. 2;

Fig. 5 is a perspective view of the resilient element;

Fig. 6 is a perspective view of one of the friction shoes;

Fig. 7 is a perspective view of one of the followers with parts in section and parts broken away for the sake of clearness;

Fig. 8 is a vertical section of a modified form of the unit;

Fig. 9 is a similar view showing the unit in compressed position;

Fig. 10 is a section along the line 10—10 of Fig. 8;

Fig. 11 is a perspective view of the resilient unit;

Fig. 12 is a perspective view of one of the friction elements; and

Fig. 13 is a perspective view of one of the followers, parts in section and parts broken away.

It is common practice to support the bolster of the truck of a railway car by means of a group of helical springs beneath each end of the bolster. Helical springs being what is termed free acting springs are likely during use to develop harmonic action. This action may be caused by regular continuous shocks that synchronize with the natural periodicity of vibration of the springs, as when the train running at a predetermined speed is given shocks by a flat wheel or bad joints in the rails, and the like. The present invention seeks to prevent this harmonic vibration or movement of the springs by providing means for dampening the vibration of these spring assemblies.

Referring now to the drawings, the reference character 10 designates a railway truck comprising the side frame 11 having a bolster opening 12 therein which is enlarged as at 13 for receiving the spring assembly 14. The end of a bolster 15 extends into the upper narrow portion of the opening 12 and is supported on the spring assembly 14 as is usual in such constructions. The spring assembly 14 may be supported directly upon the lower cord or tension member of the side frame, or upon a spring plank 16 in the usual manner.

Since the details of the structure just described constitute no part of the present invention, it is not thought necessary to further illustrate or describe the same. The spring assembly comprises a plurality of springs secured between an upper spring plate 17 and a lower spring plate 18 in the usual manner.

In the conventional spring assembly, a plurality of helical springs 19 is employed. These springs are ideal for supporting the bolster so far as resiliency is concerned, but they are open to the objection that, under certain conditions, they will develop harmonic action which may be very objectionable and sometimes develop to such an extent as to cause serious injury to the side frame on which it is used, unless some means be provided for dampening the vibration of the spring.

In the present invention, a new and improved unit 21 is employed for this purpose. This unit may be substituted for one of the helical units, or it may be used in connection with the conventional helical, as shown in Fig. 1 of the drawings. When it is used as a substitute for the inner spring of a helical unit, it is made of such dimensions that it may be easily inserted in the outer helical. This improved unit 21 comprises an upper follower 22, Fig. 2, and a

lower follower 23 which are arranged one vertically above the other. Each of these followers is hollow, as shown at 24. Since the two followers are duplicates of each other, only one, the lower follower, need be described.

It is a cup-shaped member provided with a plurality of inclined friction surfaces 25a, 25b and 25c on its inner surface which are inclined upwardly and outwardly, as shown more clearly in Figs. 2 and 7 of the drawings. These inclined surfaces are each a segment of a cylinder, as shown at 25a, 25b and 25c in Fig. 4. A plurality of these friction surfaces is provided in each follower and these surfaces are adapted to be engaged by suitable friction shoes 26a, 26b and 26c, each of which constitutes a longitudinal segment of a fusiform member shaped somewhat like a barrel stave with friction surfaces on its outer side at each end. In other words, its upper and lower outer portions are inclined inwardly and toward the ends of the resilient unit to form friction surfaces 50 and 50a spaced apart by a cutaway belt portion 60. This cutaway portion prevents the forming of shoulders on the shoes. Under normal operating conditions, the unit seldom goes solid and hence the surfaces engaged on the shoes will wear faster than the surfaces that are not engaged and as a result, shoulders are likely to be formed. By cutting away the central portions of the friction surfaces of the shoes, as at 60, that are seldom engaged in actual practice, the remaining surfaces will be uniformly worn away. Each shoe has its outer and inner surface curved in cross-section and its outer surface is seated in one of the inclined friction surfaces of the two follower members. In the form of the construction shown to illustrate one embodiment of the invention, three shoes 26a, 26b and 26c, 120° apart, are employed for frictionally engaging the corresponding inclined surfaces 25a, 25b and 25c, respectively, of the follower 22 and 23.

Suitable means are provided for forcing the shoes into frictional engagement with the followers, the same being so constructed that this radial force will increase as the unit is compressed. In the form of the device shown, a block of rubber 27 is employed for this purpose. Since rubber is almost non-compressible, the block is of such form that sufficient space is provided within the followers for accommodating the distorted material when it is compressed.

As shown, the block is fusiform, but it is understood that it may be of any other suitable form or shape. The tapered ends 20 and 30 of the block 27 engage the bottom walls of the follower, as shown in Fig. 2. The central portion of the block is provided with a circumferential recess 28 which is adapted to receive curved lugs 29 on the shoes 27 for positioning said shoes. The diameter of the block is such that when the parts are assembled, it will engage the central portion of the shoes and force them against the friction surfaces thereof. The tapered ends of the block are of such dimensions that when the unit is compressed, as shown in Fig. 3, the space surrounding the tapered ends will be substantially occupied when the unit has reached its maximum compression or goes solid, as shown in Fig. 3.

The rubber block 27 is placed in position under initial compression so that, when it is compressed, its resiliency will force the followers apart until the unit reaches its maximum expansion.

It is desirable that means be provided for preventing the complete expansion of the rubber, and, in the form of the device shown in Figs. 1 to 7, this is accomplished by providing each of the shoes 26a, 26b and 26c with lugs 31 extending radially outwardly which are adapted to engage in openings 32 provided in the followers 21 and 23, as shown in Figs. 2 and 7. These slots are of sufficient length to permit the full compression of the unit, and the shoes and followers are of such length that the shoes will engage the bottom walls of the followers and the side walls of the followers will engage each other when the unit is fully compressed. This arrangement provides a solid column which is sufficiently strong to resist the shock. The unit 21 is of substantially the same length as the helical springs 19 and of a diameter to readily slide therein. In use, the unit is substituted for the inner spring within one of the load supporting helicals, as shown in Fig. 1.

Since rubber is not so freely movable in vibrations of greater amplitude, these units will prevent harmonic action of the associated helical and of the entire spring assembly. This unit not only prevents harmonic action of the helical springs, but also functions as a load supporting resilient unit and as a means of deadening sound and cushioning shocks of small amplitude. In spring assemblies where only one of these springs is employed on each side of the truck, the unit is employed with the front outer spring on one side and with the corresponding spring diagonally across on the other side thereof, in order to properly balance the bolster.

The form of the device shown in Figs. 8 to 13 is similar to that just described, except that it is of substantially the same size as the conventional outer helical spring and is adapted to be substituted therefor, as shown at the left in Fig. 1. No inner spring can be used with this unit, so it may be substituted for an inner and an outer helical which may be arranged beneath the bolster to balance it as described above. This unit differs from the one described above in that the followers 33 and 34 are provided with depressed or inwardly extending end walls 35 and 36, respectively. These depressions are dome-shaped and are arranged axially of the unit and are adapted to engage the ends of the fusiform rubber block 37 and depress the same from each end, as shown in Fig. 8.

The shoes and inter-engaging friction surfaces between the shoes and the followers are substantially the same as that already described, and it is not thought necessary to repeat the description at this point. In this form of the construction, different means is provided for limiting the expansion of the unit after compression. As shown, each of the shoes 40 is provided at its intermediate portion with shoulders 39 and 41 which are adapted to engage similar shoulders 42 and 43 formed on the followers 33 and 34, as clearly shown in Fig. 8 of the drawings. These shoulders are so arranged that the rubber block 37 will be under initial compression when the unit is in expanded position, as shown in Fig. 8, and the parts are so arranged that, when the gear is compressed to its maximum extent, the rubber block 37 will substantially fill the space within the followers, as shown in Fig. 9 of the drawings.

There are three shoes 40, as in the construction shown in Figs. 1 to 7, and these shoes have inclined friction surfaces 44 and 45 that are seg-

ments of a cylinder that engage corresponding inclined friction surfaces 46 and 47 on the followers 33 and 34, as in the previously described construction. There is also a cutaway central portion 48 between the friction surfaces 44 and 45 that will permit the followers to contact each other upon compression of the unit to closed position. In this unit, as in the one shown in Figs. 1 to 7, the parts are of such dimensions that the ends of the shoes contact the shoes simultaneously with the engagement of the followers, whereby a solid sturdy column is provided for receiving the shock when the unit closes.

While, in the forms of construction shown, there are three friction shoes employed, it is understood that a more or less number may be used if desired.

It is thought from the foregoing, taken in connection with the accompanying drawings, 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:

1. In a resilient bolster supporting unit, an upper follower, a lower follower, a plurality of friction shoes frictionally engaging each of said followers, and a fusiform resilient element solid throughout engaging said followers and shoes.

2. In a resilient bolster supporting unit, an upper follower, a lower follower, said followers each having inclined opposed friction surfaces, friction shoes having wedging faces engaging said friction surfaces, and a fusiform block of rubber arranged coaxially with said followers and engaging said shoes and followers for forcing the same into frictional contact therewith when said unit is compressed.

3. In a resilient bolster supporting unit, an upper follower, a lower follower, said followers having inclined opposed friction surfaces, friction shoes having wedging faces engaging said friction surfaces, a fusiform block of rubber arranged coaxially with said followers and engaging said shoes and followers for forcing the same into frictional contact therewith when said unit is compressed, and cooperating means on said shoes and followers for limiting the expansion of said unit upon release.

4. In a friction spring supporting unit, a pair of chambered followers having inclined wedging faces, friction shoes each engaging a wedging face on each follower, and a fusiform block of rubber engaging said followers and shoes.

5. In a railway truck having a side frame provided with a bolster opening, a bolster having one end extending into said opening and a spring assembly for supporting said bolster, the combination of a spring unit, said unit comprising a pair of chambered followers, a fusiform block of rubber between said followers and engaging the same, and a plurality of friction shoes between said block and followers and frictionally engaging said followers whereby when said unit is compressed the distortion of said block will force said shoes into frictional contact with said followers for frictionally resisting the compression of said unit and for absorbing vibration transmitted to said unit from said assembly.

6. In a cushioning device, the combination of two heads arranged in a looking-glass symmetry, each provided with a barrel-like projection forming friction surfaces on their inner faces and each provided centrally thereof with a boss forming an annular recess between itself and the adjacent inner face, a core of rubber fitted between the two bosses and constituting the sole means to resist the approach of the heads towards each other, and a plurality of friction shoes located between the rubber core and the friction surfaces with the ends of the shoes projecting at their opposite ends into the annular recesses.

7. In a cushioning device, the combination of two heads arranged in a looking glass symmetry, each provided with a barrel-like projection forming friction surfaces on their inner faces and each provided centrally thereof with a boss forming an annular recess between itself and the adjacent inner face, a core of rubber fitted between the two bosses and acting to resist the approach of the heads towards each other, and a plurality of friction shoes located between the rubber core and the friction surfaces with the ends of the shoes at their opposite ends adapted to project into the annular recesses.

8. In a friction supporting unit, a pair of chambered followers having their open ends facing each other and having inclined interior friction surfaces, friction shoes having inclined exterior friction faces at their end portions engaging the inclined friction surfaces of said followers and a rubber block tapered materially toward each end between the followers and engaging said shoes for forcing the same against the friction surfaces of said followers when said unit is compressed, and a helical spring surrounding said unit for supporting a static load under which said unit may be positioned.

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