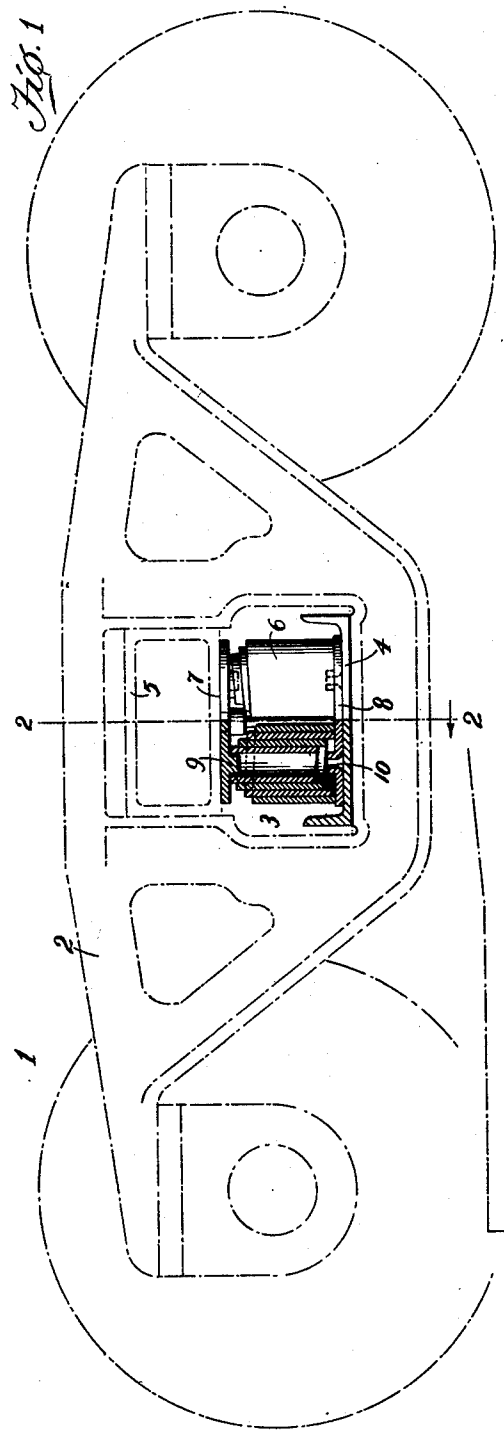
Aug. 21, 1934. C. J. HOLLAND 1,970,563

VOLUTE SPRING STRUCTURE FOR RAILWAY TRUCKS

Original Filed July 25, 1927 2 Sheets-Sheet 1

Fig. 1



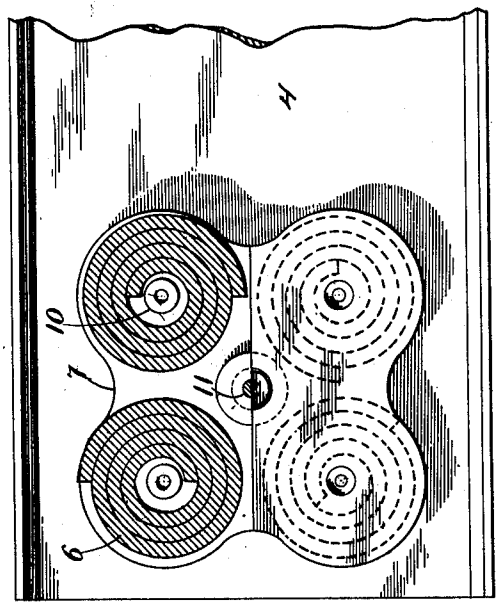
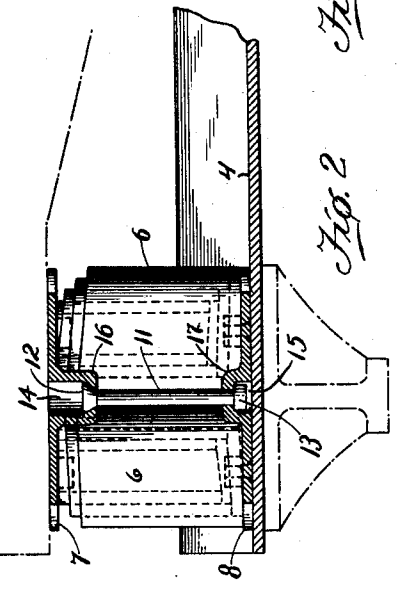


Fig. 3

Fig. 2



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VOLUTE SPRING STRUCTURE FOR RAILWAY TRUCKS

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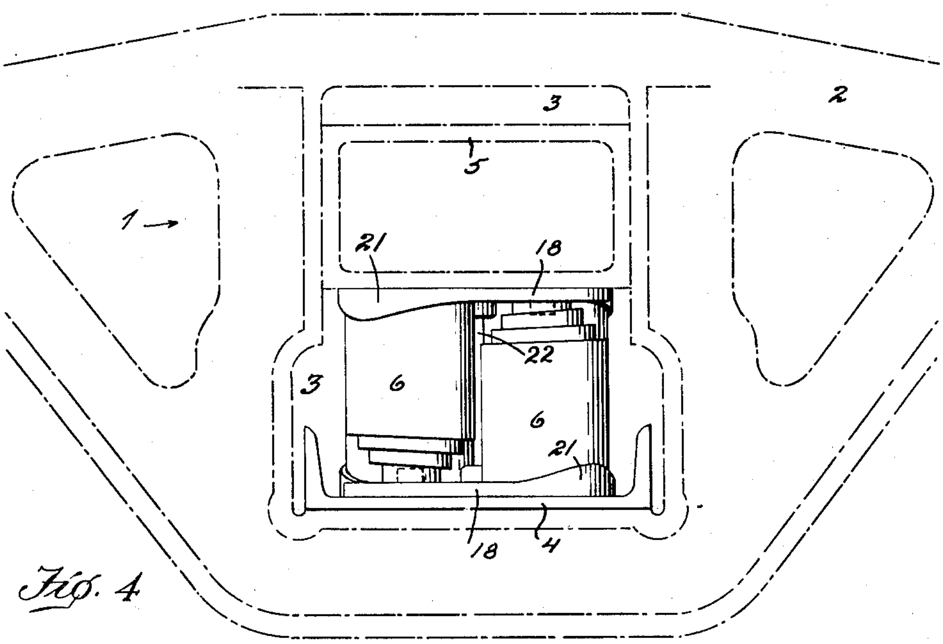

Fig. 4

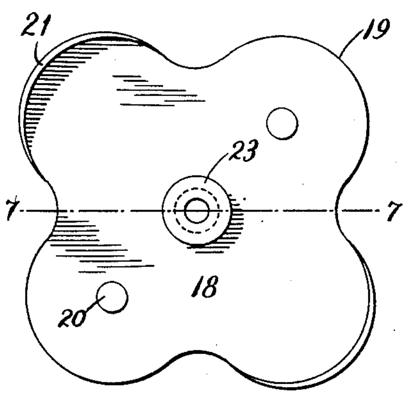

Fig. 6

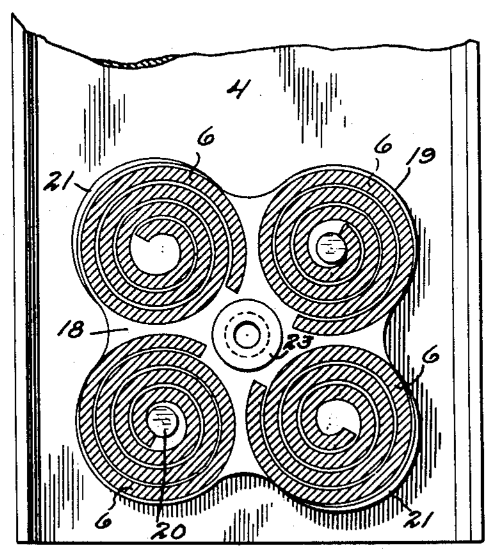

Fig. 5

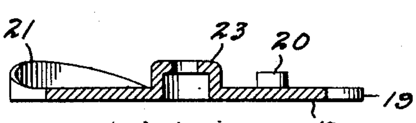

Fig. 7

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VOLUTE SPRING STRUCTURE FOR RAILWAY TRUCKS

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Application July 25, 1927, Serial No. 208,349
Renewed September 13, 1932

16 Claims. (Cl. 267—4)

The invention relates to cushioning devices or spring means used in railway trucks for resiliently supporting the load.

Until recently, the provision of cushioning means in railway trucks has been a comparatively simple problem to solve, a common practice being to provide a suitable number of helical springs interposed between the spring plank and the bolster, the size of the springs and the number employed, as well as the material from which they are constructed, depending upon the type of truck and car, that is to say depending upon whether the car be intended for passenger or freight service and, in the latter instance, depending upon the capacity. Within the last few years, considerable trouble has developed due to breakage of truck springs on account of insufficient spring capacity for cars of the heavy type and unless there is ample spring capacity provided the springs will go solid under the jars due to low joints in the rails, etc. It is not alone the springs which have failed as there have been many instances in which the side frames themselves have been broken, resulting in serious delays and expense owing to the necessity for the installation of new equipment.

The condition has become so serious that various expedients have been resorted to in the endeavor to overcome it. One plan involves the employment of a new style of truck which provides for additional spring capacity by increasing the size of the window opening in the truck side frame to accommodate a larger number of springs which are arranged in stepped relation. An objection to trucks of this type is that the wheel base is lengthened over what is considered to be the standard. Another plan has been to provide springs of different materials so as to obtain an increased capacity in the springs. Ordinarily springs have been made from carbon spring steel and by using, instead, chrome molybdenum alloy as the material from which the springs are made the spring capacity has been increased by substantially twenty-five per cent. This has been successful to some extent, probably up to fifty ton equipment, but for heavier capacity equipment there has been no successful arrangement provided other than to use a larger number of springs with the disadvantage of increasing the size of the window openings and consequently necessitating the employment of specially constructed side frames and other parts.

It is with the above facts in view that I have designed the present invention which has for its general object the provision of truck springs of such character as to have the necessary capacity without increasing the number in the group over the number of helical springs commonly used, and without necessitating any change in the side frames, the size of the window openings or the wheel base.

An important object of the invention is to provide spring means of such high capacity type which may be installed in already existing trucks without necessitating any changes or modifications therein.

More specifically stated, the invention resides in the employment of volute springs in railway trucks instead of the usual helical springs as I have discovered that springs of the first mentioned form have a much greater capacity, size for size, than those of the latter mentioned type.

Another object of the invention is to provide a group of volute springs which may be initially assembled for subsequent installation within the window opening of a side frame, various alternative arrangements, in point of relation, etc., being contemplated.

To the attainment of the foregoing and other objects and advantages, the invention preferably consists in the details of construction and the arrangement and combination of parts to be hereinafter more fully described and claimed, and illustrated in the accompanying drawings in which:

Figure 1 is a side elevation of a truck showing it equipped with my volute spring structure, the truck parts being shown by dot and dash lines and one of the springs being represented in section, this view disclosing one form of spring cap.

Figure 2 is a section taken on the line 2—2 of Figure 1,

Figure 3 is a plan view half in section of the spring assembly, the view also showing one end of the spring plank,

Figure 4 is a side elevation somewhat similar to Figure 1 and illustrating the same mode of spring structure and the preferred form of spring cap or retainer.

Figure 5 is a horizontal section through the cluster of springs and showing a plan of one end of the spring plank,

Figure 6 is a detail plan view of one of the spring caps, and

Figure 7 is a cross section therethrough on the line 7—7 of Figure 6.

Referring more particularly to the drawings, the numeral 1 designates, generally, a truck including the usual or any preferred side frame 2 having a window opening 3 at the bottom of which is mounted a spring plank 4 and within the upper portion of which is mounted the bolster 5. The truck of course includes the usual journal boxes, wheels and other details which need not be described as they are old and well known and form no part of the present invention. It is the customary practice to provide some arrangement or other of helical springs within the window opening 3 for the purpose of

supporting the bolster 5 and the spring means constituting the subject matter of this application is mounted in the same position as ordinarily though the form of the springs is entirely different as will be explained.

In accordance with my invention I provide a cushioning means for the bolster comprising a group or cluster of volute springs 6 which may be of conventional pattern and which are formed from any suitable steel, it being unnecessary to specify any particular alloy as there are various steels suitable for the purpose. The volute springs may be wound or coiled in the same direction and it is conceivable that they may all be mounted in the same relative positions, as illustrated in Figures 1 and 2 wherein they are disclosed as having their larger ends mounted upon the spring plank and their smaller ends disposed upwardly for supporting the bolster. However, the springs need not be wound or coiled in the same direction and in Figure 3 the successive ones are represented as either coiled in opposite directions, or reversed, or so arranged that their rotative tendencies will be opposite and will therefore be neutralized.

Clearly, it is necessary to maintain the springs in the proper relation and for this reason I have shown upper and lower caps 7 and 8 which may be similar or not and which are provided at a plurality of spaced points with projections 9 and 10, respectively, entering the ends of the springs. Of course the lower cap member is seated upon the spring plank while the upper cap is disposed against the underside of the bolster, and any preferred retaining means for the assembly may be provided. By having the adjacent springs oppositely wound or coiled as indicated in Figure 3 it is clear that the torsional effect of one on the cap will be counteracted by the torsional effect of the next adjacent one so that there will be no tendency to skew the caps with respect to the bolster and spring plank.

In order that the cluster may be initially assembled and maintained in assembled relation with the springs under compression so that the assembly may be afterwards inserted in place in a truck, it is preferable to provide tie means for connecting the caps, this means being, for instance, a bolt-like member 11 having headed ends 12 and 13 engaged within recesses 14 and 15 in projecting portions 16 and 17 extending toward each other from the centers of the spring caps 7 and 8 as clearly indicated in Figure 2.

Instead of having the springs all arranged in the same relation as disclosed in Figures 1 and 2, I may prefer to locate them in alternate relation as illustrated in Figure 4 wherein the adjacent springs are arranged one with its small end downwardly and the other with its small end upwardly so as to produce a more balanced effect. As mentioned in connection with the first arrangement, the springs may be coiled or wound in the same or different directions. In Figures 4 to 7 inclusive I have also illustrated a somewhat different form of cap. Of course, it is probable that two would be used and both, indicated at 18 are preferably of identical construction or counterparts. The shape may be considered more or less immaterial and would necessarily depend upon the number of springs in the cluster. However, the shape is here represented as roughly square with the corner portions 19 substantially semicircular in shape. Two opposite corner portions may be provided with projections 20 adapted to enter the smaller ends of the spring and the other two opposite corner portions are shown as having their edges formed with lips or flanges 21 disposed outwardly of the larger ends of the springs. A tie member 22, similar to the tie member 11, is also preferably employed for holding the cluster in assembled relation, this tie member necessarily having headed ends engaged within socket-like projections 23 extending toward each other from the centers of the caps. It is, however, conceivable that some alternative construction could be provided for accomplishing this same result.

The springs shown in section in Figures 1, 3 and 5 may be considered as somewhat diagrammatically represented in that the convolutions are of uniform width and thickness. This is of course a conventional type of spring and I contemplate using it in this form though I do not desire to be restricted in this respect as I may find it desirable or preferable to form the springs of tapered bar stock, that is to say tapered either in width or in thickness, or possibly in both, for instance as disclosed in my co-pending application filed Oct. 29, 1930, Serial No. 492,045 which is a division of this one.

In the above described forms of the invention I have mentioned the employment of volute springs alone. However, I do not wish to be limited in this respect as under some circumstances it may be highly desirable to equip a truck with springs of both the helical and volute type, it being necessary in such case to replace, say, two of the usual helical springs with a pair of volute springs. In actual practice I have discovered that by using this combination I have been able to obtain a capacity of 90,000 pounds for the truck known commercially as 2—D whereas by the employment of the usual four helical springs the capacity is 78,940 pounds. These figures are given only for the purpose of emphasizing the comparative capacities.

In the operation, it will of course be apparent that the springs will act to cushion the load in the same general manner as the well known helical springs. However, I have discovered that springs of this type have a much greater capacity during short travel than the usual springs so that it is a simple matter to sustain the heaviest loads without increasing the size or number of springs and therefore modifying the structure of the trucks or parts thereof. The stiffness of the springs at different points in the travel thereof can of course be regulated by the tapering feature above referred to and fully rescribed in my co-pending application and it is therefore possible to construct the springs in such manner as to obtain what may be considered the ideal condition in service.

While I have shown and described the preferred embodiment of the invention, it should be understood that the disclosure is merely an exemplification of the principles involved as the right is reserved to make all such changes in the details of construction as will widen the field of utility and increase the adaptability of the device provided such changes constitute no departure from the spirit of the invention or the scope of the claims hereunto appended.

Having thus described the invention, I claim:

1. Resilient supporting means for the bolster of a railway truck, comprising a cluster of volute springs, certain of which are reversed with respect to the others so that the rotative tendencies thereof will be opposite.

2. In a railway truck including side frames and a bolster, the side frames having openings

through which the ends of the bolster extend, resilient supporting means for the bolster comprising a cluster of volute springs located within the openings and beneath the bolster, and spring caps engaged upon the ends of the cluster, certain of the springs being reversed with respect to the others whereby the rotative tendencies exerted against the caps will be neutralized.

3. In a railway truck including side frames and a bolster, the side frames having openings through which the ends of the bolster extend, resilient supporting means for the bolster comprising a cluster of volute springs located within the openings and beneath the bolster, and spring caps engaged upon the ends of the cluster and tied together whereby the cluster may be assembled and maintained under compression for installation within already existing trucks, the successive springs being reversed whereby their rotative tendencies exerted upon the caps will be neutralized and relative rotation of the caps avoided.

4. In a railway truck, the truck including side frames and a bolster, the combination of a cluster of volute springs for supporting the bolster, certain of the springs in the cluster being reversed with respect to one another so that their rotative tendencies will be opposite whereby to obtain a balanced effect.

5. In a railway car truck including side frames and a bolster, the combination of a cluster of volute springs arranged beneath the bolster to support the same, the successive springs in the cluster being reversed in end to end relation to obtain a balanced effect.

6. In a railway car truck including side frames and a bolster, the combination of a cluster of volute springs mounted in the side frame for supporting the bolster, adjacent springs having their direction of winding reversed for counterbalancing their rotative tendency.

7. A cushioning and shock absorbing assembly comprising a plurality of volute springs arranged so that the rotative tendencies of adjacent springs will be opposite.

8. A shock absorbing and cushioning assembly comprising a plurality of springs at least certain of which are of volute form and reversed with respect to one another for obtaining a balanced effect.

9. A shock absorbing and cushioning assembly for a railway car truck including a bolster and a side frame having a window opening receiving the bolster, comprising upper and lower spring caps, and a plurality of springs interposed therebetween in side by side relation, at least certain of said springs being of volute form and arranged whereby the rotative tendencies exerted thereby upon the caps during travel will be opposite.

10. A shock absorbing and cushioning assembly comprising spaced spring caps, and a plurality of springs interposed therebetween in side by side relation, at least certain of said springs being arranged whereby the rotative tendencies exerted thereby against the caps during travel will be opposite so that the caps will not tend to rotate with respect to each other upon compression or release of the springs.

11. A spring assembly for disposition within the window opening of a truck side frame for supporting the truck bolster, comprising caps, a plurality of volute springs arranged side by side between said caps and exposed at their sides, and a tie means connecting the caps located within the confines of the springs as a group, the caps having inwardly directed spring locating portions cooperating respectively with the interior of the small end and the exterior of the large end of the volute springs, one of said portions being arranged to accommodate the tie means, thereby permitting closure of the springs without interference of the tie means with the bolster or the bottom of the window opening.

12. A spring assembly for disposition within the window opening of a truck side frame for supporting the truck bolster, comprising caps, a plurality of volute springs arranged side by side between said caps and exposed at their sides, and a tie means connecting the caps located within the confines of the springs as a group but exteriorly of the individual springs, the caps having inwardly directed spring locating portions cooperating respectively with the interior of the small end and the exterior of the large end of the volute springs, certain of said portions being formed to accommodate the tie means, thereby permitting closure of the springs without interference of the tie means with the bolster or the bottom of the window opening.

13. A spring assembly for disposition within the window opening of a truck side frame for supporting the truck bolster, comprising caps, a plurality of volute springs arranged side by side between said caps and exposed at their sides, each end of each spring directly abutting against the adjacent cap, and a tie means connecting the caps located within the confines of the springs as a group, the caps having inwardly directed spring locating portions cooperating respectively with the interior of the small end and the exterior of the large end of the volute springs, certain of said portions being formed to accommodate the tie means, thereby permitting closure of the springs without interference of the tie means with the bolster or the bottom of the window opening.

14. A spring assembly for disposition within the window opening of a truck side frame for supporting the truck bolster, comprising caps, a plurality of volute springs arranged side by side between said caps, each end of each spring directly abutting against the adjacent cap, and a tie means connecting the caps located within the confines of the springs as a group but exteriorly of the individual springs, the caps having inwardly directed spring locating portions cooperating respectively with the interior of the small end and the exterior of the large end of the volute springs, one of said portions being formed to accommodate the tie means, thereby permitting closure of the springs without interference of the tie means with the bolster or the bottom of the window opening.

15. A spring cap or seat for a volute spring assembly having inwardly directed spring locating portions cooperating respectively with the interior of the small end and the exterior of the large end of said springs, one of said portions being arranged to accommodate a tie means.

16. A spring plate for a volute spring assembly, said plate having inwardly directed portions, certain of said portions cooperating respectively with the interior of the small end and the exterior of the large end of said springs for positioning them, one of said portions being arranged to accommodate a tie means.

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