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W. E. WINE

1,934,579

SPRING UNIT AND ASSEMBLY FOR RAILWAY CARS

Filed June 28, 1932

Fig. 1.

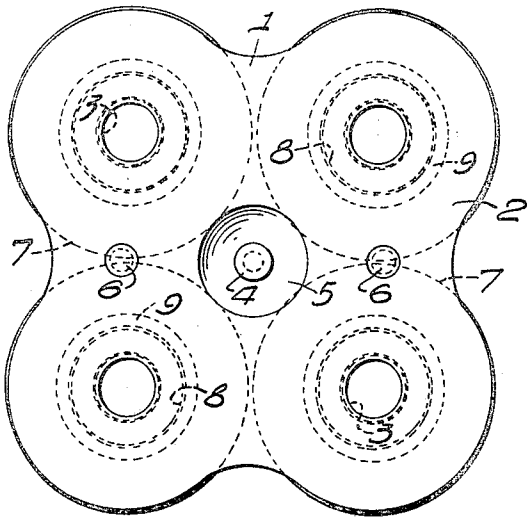


Fig. 3.

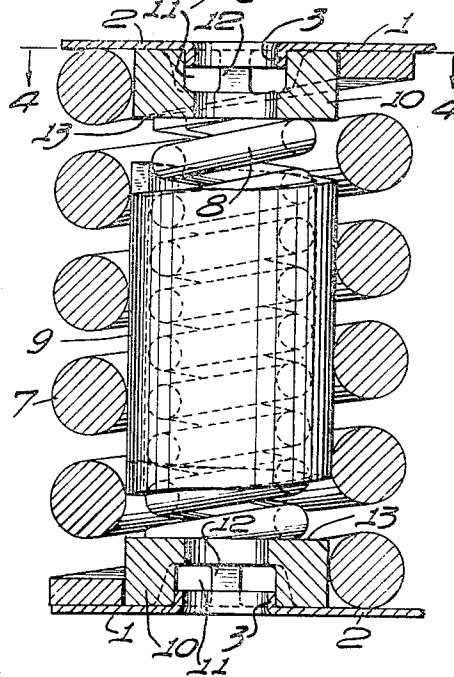


Fig. 2.

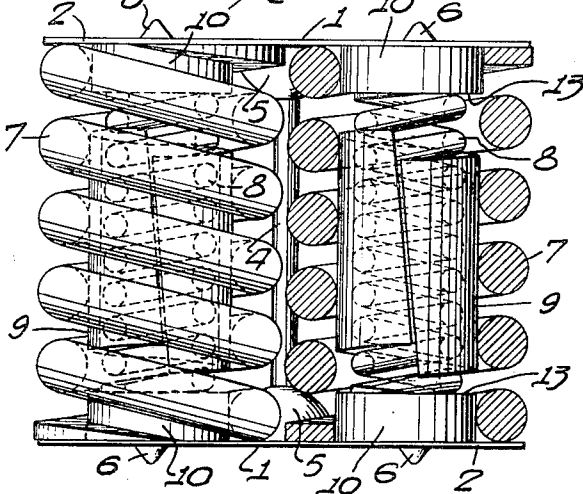


Fig. 4.

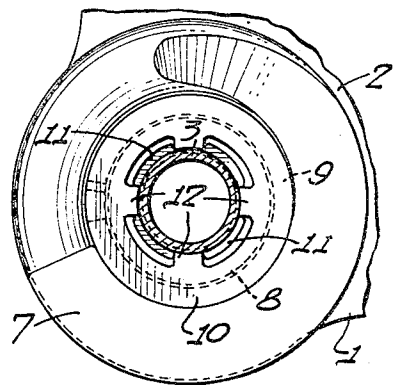


Fig. 5.

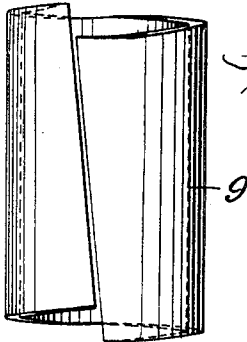
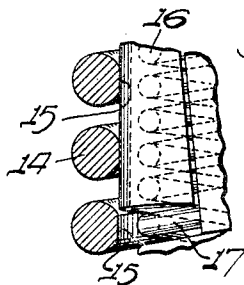


Fig. 6.



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## UNITED STATES PATENT OFFICE

1,934,579

## SPRING UNIT AND ASSEMBLY FOR RAILWAY CARS

William E. Wine, Toledo, Ohio

Application June 28, 1932. Serial No. 619,777

19 Claims. (Cl. 267—4)

My invention relates to spring units and assemblies for association with the side frames of railway car trucks to support the truck bolsters.

In standard railroad practice, the truck bolsters are supported by spring assemblies which are disposed within the window openings of the truck side frames. The spring assemblies comprise caps or plates between which helical springs are interposed, the number of springs employed depending upon the capacity of the car with which the assembly is associated. So that a maximum number of springs may be used within a minimum space, some of the springs are arranged in nests. With the increased speed at which railway cars now travel, particularly freight cars, certain inherent disadvantages exist in the use of helical springs on account of the fact that these springs have a definite period of vibration. At certain car speeds it has been found that the period of vibration of helical springs will synchronize with the passage of the truck wheels over the rail joints thus causing maximum vertical displacement of the springs and, therefore, the car body, and if this synchronization is continued for an appreciable length of time, as is often the case, the lading within the car is usually damaged and there is considerable danger of the truck wheels becoming derailed.

It is one of the principal objects of the invention to provide a spring unit involving two helical springs with means for preventing amplification of the vibrations of the springs.

Another object of the invention is to provide means for adapting such a spring unit to spring caps or plates of standard American Railway Association (hereinafter called A. R. A.) design.

A principal feature of the invention consists in providing, in combination with spaced spring caps, a spring unit involving two helical springs disposed one within the other, a longitudinally compressible sleeve disposed within one of the helical springs, and means for centering the spring unit with respect to one of the spring caps including members adapted to be interposed between the ends of the inner one of the said helical springs and the spring caps respectively adjacent thereto.

Another feature of the invention consists in providing, in combination with spaced spring caps, a spring unit which involves two helical springs disposed one within the other and a longitudinally compressible split sleeve disposed within one of said helical springs and in frictional engagement therewith, and members extending within opposite ends of the outer spring,

for centering the spring unit with respect to one of the pairs of inwardly projecting portions, each of said members having a portion for receiving one of said inwardly projecting portions and being disposed within the outer one of said helical springs.

A further feature of the invention consists in providing, in combination with spaced spring caps, a spring unit involving two helical springs disposed one within the other and the outer one of said helical springs being of greater free height than the inner one, a split sleeve compressible in the direction of its length interposed between said helical springs and in frictional engagement with one of the springs, and means for centering said helical springs with respect to the spring caps including members projecting into the outer one of the helical springs, each of said members having a portion spaced inwardly from the adjacent spring cap affording a seat for the adjacent end of the inner one of the helical springs.

A still further feature of the invention consists in providing, in combination with spaced spring caps, a spring unit involving two helical springs disposed one within the other and the outer one of said springs being of greater free height than the inner one, a longitudinally compressible split sleeve encircling the inner one of the helical springs and in frictional engagement with the outer one, and members extending into the outer one of the helical springs and respectively cooperating with the spring caps for centering the helical springs with respect thereto, each of said members having a portion spaced inwardly from the adjacent spring cap affording a seat for the adjacent end of the inner one of the helical spring and an abutment for the adjacent end of the split sleeve.

Other and more specific features of the invention residing in advantageous forms, combinations and relations of parts will hereinafter appear and be pointed out in the claims.

In the drawing illustrating a preferred embodiment of the invention:

Figure 1 is a plan view of the spring assembly.

Figure 2 is a side elevational view of the spring assembly, parts thereof being in section.

Figure 3 is an enlarged sectional view of one of the spring units and adjacent portions of the spring caps, the inner helical spring and the split sleeve being in elevation.

Figure 4 is a sectional view taken on line 4—4, Figure 3.

Figure 5 is a side elevational view of the longitudinally compressible split sleeve.

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Figure 6 is a fragmentary view partly in section and partly in elevation of a modified form of the invention.

Referring more particularly to the drawing, 1 designates top and bottom spring caps of standard A. R. A. design which are, as is well known, identical in construction. The caps illustrated are of the customary shape for use in connection with a cluster of four A. R. A. spring nests but it is to be understood that the invention is applicable to caps which are designed for use in connection with any number of spring nests. Each of the spring caps has a main body portion 2 and a plurality of inwardly extending annular flanges 3 which are respectively adapted to extend within the adjacent ends of the spring nests for centering them and restraining them from lateral movement with respect to the spring cap. As is usual, the spring assembly is held together by a bolt 4 which passes through openings formed in inwardly projecting centrally depressed portions 5. Moreover, as is customary, the spring caps are formed with outwardly extending projections 6 for cooperating with portions of the side frame, not shown, and truck bolster, not shown, to prevent lateral movement of the spring assembly.

In carrying out the present invention a helical spring 7 corresponding in all details to the outside helical spring of a standard A. R. A. spring nest may be employed. Disposed within the helical spring 7 is a spring device 8, preferably in the form of a helical spring, which corresponds to the inner helical spring of a standard A. R. A. spring nest but its outside diameter is less than the outside diameter of the latter and it is made from stock heavier than that from which the inner coil of a standard A. R. A. nest is made. Moreover, the free height of the helical spring 8 is less than the free height of the corresponding spring of a standard A. R. A. nest and is, therefore, less than the free height of the outer helical spring 7. Interposed between the helical springs 7 and 8 and encircling the latter is a longitudinally compressible split sleeve 9 which is preferably in frictional engagement with one of the springs. This sleeve may be made in any convenient or desirable manner as for instance by cylindrically coiling a metal plate and then longitudinally displacing its free ends in opposite directions. The outside diameter of the split sleeve 9 is preferably greater than the inside diameter of the outer helical spring 7 so that when it is inserted within the latter by being contracted circumferentially it will expand and remain at all times in frictional engagement with the inner surfaces of the spring 7 and thereby serve as a dampener to prevent undesirable amplification of the vibrations of the spring.

To adapt the spring unit just described to standard A. R. A. spring caps, members 10 are respectively interposed between the ends of the inner helical spring 8 and the spring caps. Each of these members may advantageously be of cast metal and so that it may be easily and conveniently cast it is made in the form of an annulus having an opening 11 the diameter of which is greater adjacent the outer side thereof than adjacent the inner side. The opening 11 of each member is adapted to receive the inwardly projecting annular flange 3 of the adjacent spring cap and so that it will be unnecessary to machine the entire surface of that portion of the opening which overlaps the outer surface of the annular

flange 3 to obtain intimate contact between the flange and the member 10 the latter is provided with a plurality of lugs or projections 12 which extend into the opening 11 to engage and cooperate with the annular flange. The members 10 are disposed within the outer helical spring 7 and each is formed with a surface 13 spaced inwardly from the adjacent spring cap to afford a seat for the adjacent end of the inner helical spring 8. The external diameter of the members 10 is slightly less than the internal diameter of the helical spring 7 whereby not only is the spring centered with respect to the annular flanges 3 but the spring is effectively prevented from moving laterally.

The split resilient sleeve 9 is of less free height than the inner helical spring 8 so that it is not subjected to longitudinally compressible forces until both the inner and outer helical springs have been compressed for a considerable distance. In this manner the split sleeve 9 does not materially increase the capacity of the spring unit until just before the helical springs have reached their limit of travel. It is to be observed that due to the frictional forces between the split sleeve and the outer helical spring 7, the sleeve will always be disposed equidistant between the ends of the helical springs. It will, of course, be appreciated that to accomplish the purpose of the present invention it is not necessary that each of the standard A. R. A. spring nests be replaced by the spring units illustrated, as it will be found that if only one of the spring nests of a cluster of four is replaced by the unit herein described, it will materially assist in overcoming the undesirable features of a standard spring assembly.

In Figure 6 illustrating a slightly modified form of the invention an outer helical spring 14 is employed which is preferably identical with the corresponding standard A. R. A. spring 7 illustrated in the preferred form of the invention except that the inner surfaces of the spring coils are flattened as at 15 to provide plane surfaces affording extended bearing areas for a split sleeve 16. This sleeve is preferably of the same construction as sleeve 9 shown in the preferred form of the invention and it is adapted to be of frictional engagement with the flattened surfaces 15. As the stock from which the spring 14 is formed is of the same size as that from which spring 7 is formed it will be appreciated that since the spring 14 is provided with the flattened surfaces 15 the internal diameter of the latter is greater than the corresponding diameter of spring 7. The sleeve 16 which cooperates with spring 14 is, therefore, of greater diameter than the sleeve 9 which cooperates with spring 7. Moreover, the diameter and consequently the capacity of the helical spring 14 which is disposed within the sleeve 16 can be greater than the corresponding characteristics of the inner helical spring 8. Although the flattened surfaces 15 would probably be expected to decrease the capacity of the spring 14 from observations which have been made such does not appear to be the case but, on the contrary, they appear to have the effect of increasing the capacity of the spring. This may be in some measure accounted for by the fact that the innermost portions of the coils of a helical spring are under the greatest stress and that by removing these portions the stresses are distributed more uniformly throughout the portions of the coils. However, even though in

some cases it may be found that the flattened portions decrease the capacity of the spring this loss of capacity in the spring 14 will not affect the capacity of the spring unit as a whole since, as pointed out above, the inner helical spring of this unit may be of greater capacity than the inner helical spring of the unit illustrated in the preferred form of the invention. It will, of course, be appreciated that as the flattened surfaces 15 provide extended bearing areas for the split sleeve 16 the latter will cooperate with the spring 14 in a most efficient and effective manner.

From the foregoing it will be apparent that simple and efficient means has been devised for preventing the undesirable amplification of helical springs and that simple and rugged means has been devised for adapting the spring unit herein disclosed to spring caps of standard A. R. A. design.

I claim:

1. A spring assembly for association with a side frame of a railway car truck to support the truck bolster, said assembly comprising spaced spring caps adapted to receive between them a plurality of nests of helical springs and provided with a plurality of pairs of inwardly projecting portions respectively adapted to extend within the opposite ends of said spring nests for centering them, a plurality of spring units interposed between the spring caps, at least one of said units involving two helical springs disposed one within the other, a longitudinally compressible split sleeve disposed within one of said helical springs, and members interposed between the ends of the inner one of said helical springs and the spring caps respectively adjacent thereto for centering said helical springs with respect to one of said pairs of inwardly projecting portions, each of said members having a portion for receiving one of said inwardly projecting portions and being disposed within the outer one of said helical springs.

2. A spring assembly for association with a side frame of a railway car truck to support the truck bolster, said assembly comprising spaced spring caps adapted to receive between them a plurality of nests of helical springs and provided with a plurality of pairs of inwardly projecting portions respectively adapted to extend within the opposite ends of said spring nests for centering them, a plurality of spring units interposed between the spring caps, at least one of said units involving two helical springs disposed one within the other, a split resilient sleeve compressible in the direction of its length interposed between said helical springs, and means for centering said helical spring with respect to one of said pairs of inwardly projecting portions of the spring caps including members interposed between the ends of the inner one of said helical springs and the spring caps respectively adjacent thereto, each of said members extending within the outer one of said helical springs and having a recessed portion for receiving one of said inwardly projecting portions.

3. A spring assembly for association with a side frame of a railway car truck to support the truck bolster, said assembly comprising spaced spring caps adapted to receive between them a plurality of nests of helical springs and provided with a plurality of pairs of inwardly projecting portions respectively adapted to extend within the opposite ends of said spring nests for centering them, a plurality of spring

units interposed between the spring caps, at least one of said units involving two helical springs disposed one within the other, a longitudinally compressible split sleeve disposed within one of said helical springs and in frictional engagement therewith, and members interposed between the ends of the inner one of said springs and the spring caps respectively adjacent thereto for centering said helical springs with respect to one of said pairs of inwardly projecting portions, each of said members having a portion for receiving one of said inwardly projecting portions and being disposed within the outer one of said helical springs.

4. A spring assembly for association with a side frame of a railway car truck to support the truck bolster, said assembly comprising spaced spring caps adapted to receive between them a plurality of nests of helical springs and provided with a plurality of pairs of inwardly projecting portions respectively adapted to extend within the opposite ends of said spring nests for centering them, a plurality of spring units interposed between the spring caps, at least one of said units involving two helical springs disposed one within the other, a split spring sleeve compressible in the direction of its length interposed between said springs and in frictional engagement with one of said springs, and means for centering said helical springs with respect to one of said pairs of inwardly projecting portions of the spring caps including members interposed between the ends of the inner one of said helical springs and the spring caps respectively adjacent thereto, each of said members extending within the outer one of said helical springs and having a recessed portion for receiving one of said inwardly projecting portions.

5. A spring assembly for association with a side frame of a railway car truck to support the truck bolster, said assembly comprising spaced spring caps adapted to receive between them a plurality of nests of helical springs and provided with a plurality of pairs of inwardly projecting annular flanges respectively adapted to extend within the opposite ends of said spring nests for centering them, a plurality of spring units interposed between the spring caps, at least one of said units involving two helical springs disposed one within the other, a longitudinally compressible split sleeve disposed within one of said helical springs, and means for centering said helical springs with respect to one of said pairs of inwardly projecting annular flanges of the spring caps including members interposed between the ends of the inner one of said helical springs and the spring caps respectively adjacent thereto, each of said members extending within the outer one of said helical springs and having a recessed portion for receiving one of said inwardly projecting annular flanges.

6. A spring assembly for association with a side frame of a railway car truck to support the truck bolster, said assembly comprising spaced spring caps adapted to receive between them a plurality of nests of helical springs and provided with a plurality of pairs of inwardly projecting annular flanges respectively adapted to extend within the opposite ends of said spring nests for centering them, a plurality of spring units interposed between the spring caps, at least one of said units involving two helical springs disposed one within the other, a longitudinally compressible split sleeve disposed within one of said helical springs and in frictional engagement therewith, and

members interposed between the ends of the inner one of said helical springs and the spring caps respectively adjacent thereto for centering said helical springs with respect to one of said pairs of inwardly projecting annular flanges, each of said members having a portion for receiving one of said annular flanges and being disposed within the outer one of said helical springs.

7. A spring assembly for association with a side frame of a railway car truck to support the truck bolster, said assembly comprising spaced spring caps adapted to receive between them a plurality of nests of helical springs and provided with a plurality of pairs of inwardly projecting portions respectively adapted to extend within the opposite ends of said spring nests for centering them, a plurality of spring units interposed between the spring caps, at least one of said units involving two helical springs disposed one within the other, the outer one of said helical springs being of greater free height than the inner one, a longitudinally compressible sleeve disposed within one of said helical springs, and members extending into the outer one of said helical springs and respectively cooperating with one of said pairs of inwardly projecting portions of the spring caps for centering the helical springs with respect thereto, each of said members having a portion spaced inwardly from the adjacent spring cap affording a seat for the adjacent end of the inner one of said helical springs.

8. A spring assembly for association with a side frame of a railway car truck to support the truck bolster, said assembly comprising spaced spring caps adapted to receive between them a plurality of nests of helical springs and provided with a plurality of pairs of inwardly projecting portions respectively adapted to extend within the opposite ends of said spring nests for centering them, a plurality of spring units interposed between the spring caps, at least one of said units involving two helical springs disposed one within the other, the outer one of said helical springs being of greater free height than the inner one, a split sleeve compressible in the direction of its length interposed between said helical springs, and means for centering said helical springs with respect to one of said pairs of inwardly projecting portions of the spring caps including members projecting into the outer one of said helical springs, each of said members having a portion for receiving one of said inwardly projecting portions and a portion spaced inwardly from the adjacent spring cap affording a seat for the adjacent end of the inner one of said helical springs.

9. A spring assembly for association with a side frame of a railway car truck to support the truck bolster, said assembly comprising spaced spring caps adapted to receive between them a plurality of nests of helical springs and provided with a plurality of pairs of inwardly projecting portions respectively adapted to extend within the opposite ends of said spring nests for centering them, a plurality of spring units interposed between the spring caps, at least one of said units involving two helical springs disposed one within the other, the outer one of said helical springs being of greater free height than the inner one, a longitudinally compressible sleeve disposed within one of said helical springs and in frictional engagement therewith, and members extending into the outer one of said helical springs and respectively cooperating with one of said pairs of inwardly projecting portions of the spring caps for centering the helical springs with respect thereto,

each of said members having a portion spaced inwardly from the adjacent spring cap affording a seat for the adjacent end of the inner one of said helical springs.

10. A spring assembly for association with a side frame of a railway car truck to support the truck bolster, said assembly comprising spaced spring caps adapted to receive between them a plurality of nests of helical springs and provided with a plurality of pairs of inwardly projecting portions respectively adapted to extend within the opposite ends of said spring nests for centering them, a plurality of spring units interposed between the spring caps, at least one of said units involving two helical springs disposed one within the other, the outer one of said helical springs being of greater free height than the inner one, a longitudinally compressible split sleeve disposed within one of said helical springs and in frictional engagement therewith, and means for centering said helical springs with respect to one of said pairs of inwardly projecting portions including members projecting into the outer one of said helical springs, each of said members having a portion for receiving one of said inwardly projecting portions and a portion spaced inwardly from the adjacent spring cap affording a seat for the adjacent end of the inner one of said helical springs and an abutment for the adjacent end of said split sleeve.

11. A spring assembly for association with a side frame of a railway car truck to support the truck bolster, said assembly comprising spaced spring caps adapted to receive between them a plurality of nests of helical springs and provided with a plurality of pairs of inwardly projecting portions respectively adapted to extend within the opposite ends of said spring nests for centering them, a plurality of spring units interposed between the spring caps, at least one of said units involving two helical springs disposed one within the other, the outer one of said helical springs being of greater free height than the inner one, a split spring sleeve compressible in the direction of its length interposed between said helical spring and in frictional engagement with one of said springs, and members extending into the outer one of said helical springs and respectively cooperating with one of said pairs of inwardly projecting portions of the spring caps for centering the helical springs with respect thereto, each of said members having a portion spaced inwardly from the adjacent spring cap affording a seat for the adjacent end of the inner one of said helical springs and an abutment for the adjacent end of said split sleeve.

12. A spring assembly for association with a side frame of a railway car truck to support the truck bolster, said assembly comprising spaced spring caps adapted to receive between them a plurality of nests of helical springs and provided with a plurality of pairs of inwardly projecting annular flanges respectively adapted to extend within the opposite ends of said spring nests for centering them, a plurality of spring units interposed between the spring caps, at least one of said units involving two helical springs disposed one within the other, the outer one of said helical springs being of greater free height than the inner one, a longitudinally compressible sleeve encircling the inner one of said helical springs and in frictional engagement with the outer one, and members extending into the outer one of said helical springs and respectively cooperating with one of said pairs of inwardly projecting annular

flanges of the spring caps for centering the helical springs with respect thereto, each of said members having a portion spaced inwardly from the adjacent spring cap affording a seat for the adjacent end of the inner one of said helical springs and an abutment for the adjacent end of said split sleeve.

in frictional engagement therewith, the inner surface of the coils of said last-named spring being flattened for engagement with said sleeve, and members interposed between the ends of the inner one of said springs and the spring caps respectively adjacent thereto for centering said helical springs with respect to one of said pairs of inwardly projecting portions, each of said members having a portion for receiving one of said inwardly projecting portions and being disposed within the outer one of said helical springs.

16. A spring assembly for association with a side frame of a railway car truck to support the truck bolster, said assembly comprising spaced spring caps adapted to receive between them a plurality of nests of helical springs and provided with a plurality of pairs of inwardly projecting annular flanges respectively adapted to extend within the opposite ends of said spring nests for centering them, a plurality of spring units interposed between the spring caps, at least one of said units involving two helical springs disposed one within the other, the outer one of said helical springs being of greater free height than the inner one, a split sleeve compressible in the direction of its length interposed between said helical springs and in frictional engagement with one of said springs, and means for centering said helical springs with respect to one of said pairs of inwardly projecting annular flanges including members projecting into the outer one of said helical springs, each of said members having a portion for receiving one of said annular flanges and a portion spaced inwardly from the adjacent spring cap affording a seat for the adjacent end of the inner one of said helical springs and an abutment for the adjacent end of said split sleeve.

17. A spring unit for a railway car truck adapted to be interposed between spring caps, said unit comprising a plurality of substantially concentrically arranged spring devices disposed one within the other, a split sleeve encircling the inner one of said spring devices, and members respectively extending within opposite ends of the outer one of said spring devices affording seats for the inner one of said spring devices and abutments for said split sleeve, said members being adapted to respectively cooperate with said spring caps for preventing lateral movement of the spring unit with respect thereto.

18. A spring unit for a railway car truck adapted to be interposed between spring caps, said unit involving a plurality of concentrically arranged spring devices disposed one within the other, a longitudinally compressible split sleeve interposed between said spring devices in frictional engagement with one of said spring devices, and members respectively extending within opposite ends of the outer one of said spring devices and adapted to cooperate with said spring caps for preventing lateral movement of the spring unit with respect thereto, each of said members affording a seat for the adjacent end of the inner one of said spring devices and an abutment for the adjacent end of said split sleeve.

19. A spring unit for a railway car truck adapted to be interposed between spring caps, said unit involving a helical spring, a spring device disposed within the helical spring, a longitudinally compressible split sleeve encircling said spring device, and members respectively extending within opposite ends of said helical spring adapted to cooperate with said spring caps for preventing lateral movement of the spring unit with respect thereto, each of said members affording a seat for the adjacent end of said spring device and an abutment for said split sleeve.

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13. A spring assembly for association with a side frame of a railway car truck to support the truck bolster, said assembly comprising spaced spring caps adapted to receive between them a plurality of nests of helical springs and provided with a plurality of pairs of inwardly projecting annular flanges respectively adapted to extend within the opposite ends of said spring nests for centering them, a plurality of spring units interposed between the spring caps, at least one of said units involving two helical springs disposed one within the other, the outer one of said helical springs being of greater free height than the inner one, a split sleeve compressible in the direction of its length interposed between said helical springs and in frictional engagement with one of said springs, and means for centering said helical springs with respect to one of said pairs of inwardly projecting annular flanges including members projecting into the outer one of said helical springs, each of said members having a portion for receiving one of said annular flanges and a portion spaced inwardly from the adjacent spring cap affording a seat for the adjacent end of the inner one of said helical springs and an abutment for the adjacent end of said split sleeve.

14. A spring assembly for association with a side frame of a railway car truck to support the truck bolster, said assembly comprising spaced spring caps adapted to receive between them a plurality of nests of helical springs and provided with a plurality of pairs of inwardly projecting portions respectively adapted to extend within the opposite ends of said spring nests for centering them, a plurality of spring units interposed between the spring caps, at least one of said units involving two helical springs disposed one within the other, a split spring sleeve compressible in the direction of its length interposed between said springs and in frictional engagement with one of said springs, said last-named spring having substantially plane surfaces engageable by said sleeve, and means for centering said helical springs with respect to one of said pairs of inwardly projecting portions of the spring caps including members interposed between the ends of the inner one of said helical springs and the spring caps respectively adjacent thereto, each of said members extending within the outer one of said helical springs and having a recessed portion for receiving one of said inwardly projecting portions.

15. A spring assembly for association with a side frame of a railway car truck to support the truck bolster, said assembly comprising spaced spring caps adapted to receive between them a plurality of nests of helical springs and provided with a plurality of pairs of inwardly projecting portions respectively adapted to extend within the opposite ends of said spring nests for centering them, a plurality of spring units interposed between the spring caps, at least one of said units involving two helical springs disposed one within the other and respectively having a plurality of coils, a longitudinally compressible split sleeve disposed within one of said helical springs and