R. VOSE.

Car Spring.

No. 41,950. Patented Mar. 15, 1864.

Fig. 1.

Fig. 2.

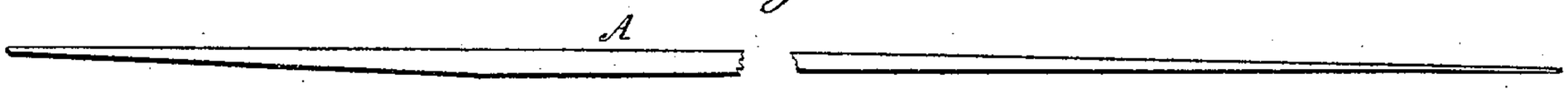


Fig. 3.

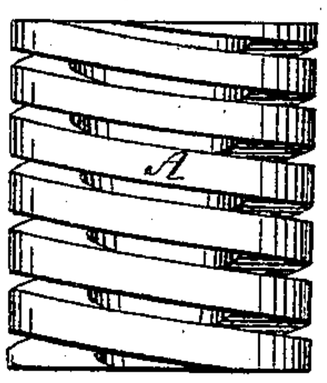


Fig. 10.

Fig. 9.

Fig. 4.

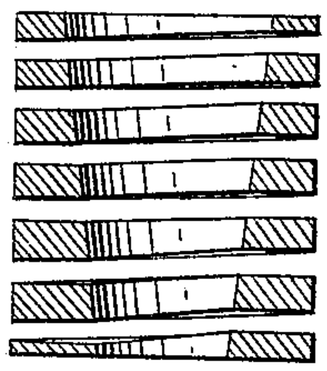


Fig. 5.

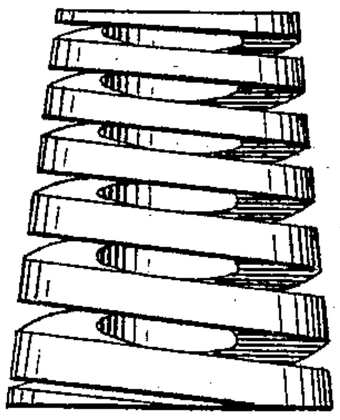


Fig. 6.

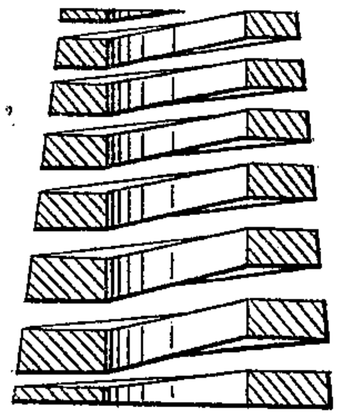


Fig. 7.

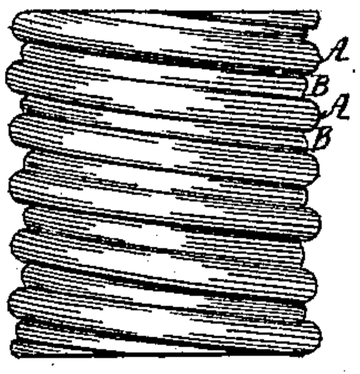
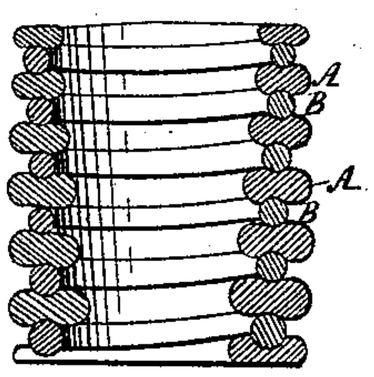


Fig. 8.



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UNITED STATES PATENT OFFICE.

RICHARD VOSE, OF NEW YORK, N. Y.

IMPROVEMENT IN HELICAL SPRINGS.

Specification forming part of Letters Patent No. **41,950**, dated March 15, 1864.

To all whom it may concern:

Be it known that I, RICHARD VOSE, of the city, county, and State of New York, have invented a new and useful Improvement in Helical Springs for Railroad-Cars and Other Vehicles; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, which form a part of this specification, and of which—

Figure 1 is a top view, and Fig. 2 a side view, of the ends of a bar of metal, tapering both in width and thickness, of which my improved spring is constructed. Fig. 3 is a side elevation, and Fig. 4 a central vertical section, of a spiral spring formed by coiling a tapering bar of metal upon a conical mandrel. Fig. 5 is a side elevation, and Fig. 6 a central vertical section, of my improved spring when formed by coiling a tapering bar upon a cylindrical mandrel. Figs. 7 and 8 are respectively an elevation and cross-section of my improved spring, formed of a fluted or grooved tapering bar of metal coiled on a conical mandrel and perfected by the interposition of india-rubber or of some fibrous material between its coils. Figs. 9 and 10 represent other forms of metallic bars, the one tapering from its center each way, the other tapering from either end toward its center, of which I intend to form coiled springs, as hereinafter described.

Similar letters indicate like parts in each of the drawings.

It is well known that a spring formed by coiling a bar of metal upon a conical mandrel, so that the coils shall gradually contract in their diameter from one end of the helix to the other, will more readily accommodate itself to varying weights or loads and afford a more uniform action under all circumstances than a helical spring whose coils are uniform throughout in size, for in the former the larger coils, forming its base, having, because of their increased diameter, the least stiffness, are more sensitive and will yield under pressure or weight much more readily than the upper and smaller coils, which will remain rigid and unyielding. Heretofore such graduated or conical spiral springs have invariably been manufactured of metallic bars, the which, however shaped transversely, were uniform in size and thickness from end to end; but it has been found that the lesser coils, forming the apex or upper end of these springs, being, from their small diameter, more rigid and less elastic than the coils approaching the base of the spring, are made to do the heaviest work and bear the greatest strain, although necessarily the less able to bear such strain, and that they are consequently extremely liable to fracture and very soon lose all resilient power. These defects in springs of this character more than overbalance their inherent advantages, and it is the object of my invention to overcome them and to furnish a helical spring which shall be most sensitive at its upper end and be graduated in the measure of its play or elastic action from top to bottom, leaving the coils which have the greatest strength, endurance, and elastic force to sustain the heaviest weight and bear the greatest burden and strain.

To attain this object I form my helical spring of a metallic bar, A, tapering gradually both in width and thickness (or in some cases in the one direction alone) from end to end, as seen in Figs. 1 and 2, and accomplish my aim in one of two ways: first, by coiling the tapering bar upon a tapering mandrel, so shaped in respect to the bar as that when the latter is coiled thereupon the outer edges of the coils will all be uniform in diameter and the exterior of the spring be consequently perfectly cylindrical in form, as seen in Figs. 3 and 4; second, by coiling the tapering bar in such a manner as that its central aperture shall be cylindrical, as illustrated by Figs. 5 and 6, thus giving greater strength to the lighter portion of the spring by diminishing the diameter of the coils in that portion thereof, the size of the coiled bar being, however, so graduated toward this upper end of the spring as to leave the upper coils more elastic than the lower and heavier portion of the spring.

The first spring, Figs. 3 and 4, affords the advantages of equal bearings at both ends and gives a greater range or scale of elastic play than any other; but for heavy, steady work, and pressure the second spring, Figs. 5 and 6, is perhaps the best. It will be observed that in either form of spring the upper end thereof is more sensitive than the lower portion, differing in this respect, as has been hereinbefore remarked, from all other forms of conical or graduated helical springs.

As experience teaches that spiral springs

(for vehicles) of all kinds have but little durability where there is a possibility of contact between the several coils, because of the destructive effect upon the steel resulting from the concussive blows of metal upon metal when the springs are in full action, I prefer to pack my improved springs with india-rubber, gutta-percha, felt, wool, or other gummy or fibrous elastic material, B, as illustrated in Figs. 7 and 8 of the accompanying drawings, and described and secured to me by Letters Patent bearing date March 11, 1862.

In cases where springs are required which shall possess a double range of self-graduating elastic power I contemplate manufacturing helical springs out of metallic bars which shall taper either from their center to their ends, as illustrated by Fig. 9, or vice versa, as seen in Fig. 10.

A spring formed of a bar of metal having the former shape will have an equal degree of sensitiveness at each end thereof, while its center will be capable of bearing with elastic force loads which would exhaust the outer coils. In a spring formed by coiling the bar shown in Fig. 10 the center of the spring would be the lightest.

I disclaim as my invention the use of a conical spring formed by coiling a bar uniform in size throughout its length; but,

Having thus fully described my improvement in spiral springs, what I claim therein as new, and desire to secure by Letters Patent, is—

The use of a metallic bar varying in width or thickness either from end to end or from center to ends when it is coiled into a helical spring substantially in the manner and for the purpose herein set forth.

The foregoing specification of my improvement in helical springs signed by me this 2d day of December, A. D. 1863.

RICHD. VOSE.

In presence of—

A. L. BUTLER,

RICHD. S. PALMER.