R. VOSE.
Car-Spring.

No. 214,328. Patented April 15, 1879.

Fig. 1.

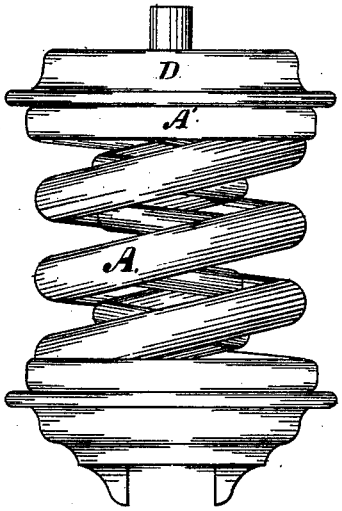



Fig. 2.

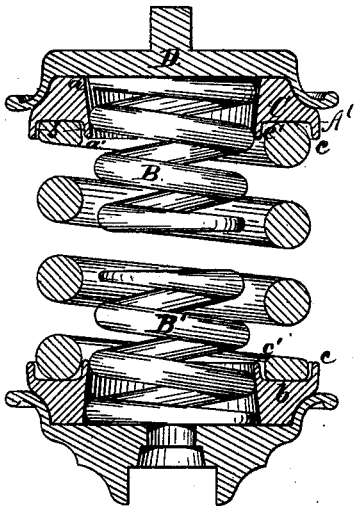
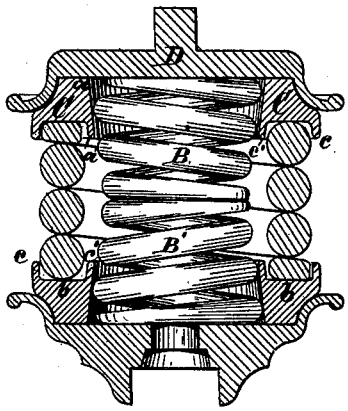



Fig. 3.




Witnesses:

Inventor

# UNITED STATES PATENT OFFICE.

RICHARD VOSE, OF NEW YORK, N. Y.

## IMPROVEMENT IN CAR-SPRINGS.

Specification forming part of Letters Patent No. **214,328**, dated April 15, 1879; application filed February 24, 1879.

*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 Spring and End Cap for the Same, of which the following is a specification, reference being had to the drawings accompanying the same and making a part thereof, in which—

Figure 1 is a side perspective view of my invention. Fig. 2 is a sectional view cut through Fig. 1; and Fig. 3, a like sectional view of my invention, showing the spring at its limit of bearing capacity being weighted down.

My invention relates to an improved spring, the same consisting of an outer helical coiled spring of metal, of an equal diameter at all points, in combination with one or more interior conically-shaped helical coils, whose longitude is less than that of the outer coil, and the base ends of which are held in place by the improved cap or end piece, more particularly described hereinafter.

In the drawings, A represents the outer coil, whose diameter, when not weighted, is equal at all points, and the longitude of which is the height of the required spring, with the cap or end piece employed. B B′ are two conically-shaped coiled springs, the combined length of which is less than that of the coil A, and whose opposing ends are of less diameter than the other. Strictly speaking, these coils are frustums of a cone in shape, the apex or sharp end being cut away. These coiled cone-springs are placed and held on the interior of the coil A by means of the cap A′, having the rim-piece or ring C, which ring has inner sloping sides *a a′*, on which rim fits the covering D, as shown. By this means the cones are held suspended, free from contact with the outer coil, and at no time, even when the maximum bearing capacity of the spring is reached, is there any contact between the inner conical and exterior straight-sided coil.

When the greatest bearing capacity of the spring is reached, the ends of the two springs B B′ are pressed together and their length reduced, as shown in Fig. 3, and the length of the outer coil being reduced, the two conical coils act as auxiliaries to said outer coil, A; yet at no time do the two conical springs B B′ bilge at their point of contact with each other, or otherwise, so as to touch or rub the interior sides of the spring A. By means of the use of these two cones or frustum-shaped coiled springs, with the outer spring, A, a spring is constructed which, having less metal than double coiled springs, is yet as strong and as durable, less cumbersome, and at the same time forming a perfectly-graduated spring, in which, as the bearing-weight is increased, the resistance of the spring is also increased.

If desired, a single conical coil may be used, and, if necessary, its length increased, but not to equal the length of the outer coil. As thus formed, the single conical coil will act as an auxiliary to the outer coil, A.

The cap or holder herein shown consists of a single piece of metal. C is the rim, the interior sides of which are sloping or conically-shaped, the diameter at the upper surface, as at *a*, being of a greater diameter than that at *a′* at the lower surface. In this opening is set or placed the interior coil, the base of the cone resting in the said rim and impinging against its sides, so as not to pass through, while the apex of the interior spring projects downward.

*c c′* are two projections or shoulders formed on the said rim C, on the outer lower side, between which is the space *b*, in which space and between said shoulders the exterior spring is held in position.

The covering D may be dispensed with, and the weight rest directly upon the rim C, when lack of space prevents its use.

It will be perceived, as shown in Fig. 3, that when the outer coil is at its greatest or maximum bearing capacity, and its coils rest one on the other, the conical coils are not so, the coils of the cones not touching each other, the cone or cones not being pressed to their shortest length. The object of so constructing the spring is for the purpose of preventing fracture of the inner cone-coils, which, while acting as auxiliaries, are not weighted to their utmost limit.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A spring composed of the exterior helical coiled spring, A, in combination with the interior conically-shaped coil-spring, B, one or more, the length of which is less than that of

the exterior coil, which interior coil or coils serve as an auxiliary to the exterior, forming thereby a graduated metal spring, substantially as described.

2. The cap or covering for the end of springs, composed of the cap A, having the rim C, with sloping conical sides *c c'*, with or without the cover D, all as described.

3. The combination of a spring composed of the exterior helical coil-spring, A, in combination with the interior conically-shaped coil-spring, B, one or more, as described, with a cap composed of the rim or ring C, having sloping conical sides *a a'* on its interior, all as specified.

Witness my hand this 21st day of February, 1879.

RICHD. VOSE.

Witnesses:

JUNIUS SCHENCK,

W. S. SILVER.