(No Model.)

S. A. KILMER.

SPRING.

No. 361,298. Patented Apr. 19, 1887.

Fig. 1.

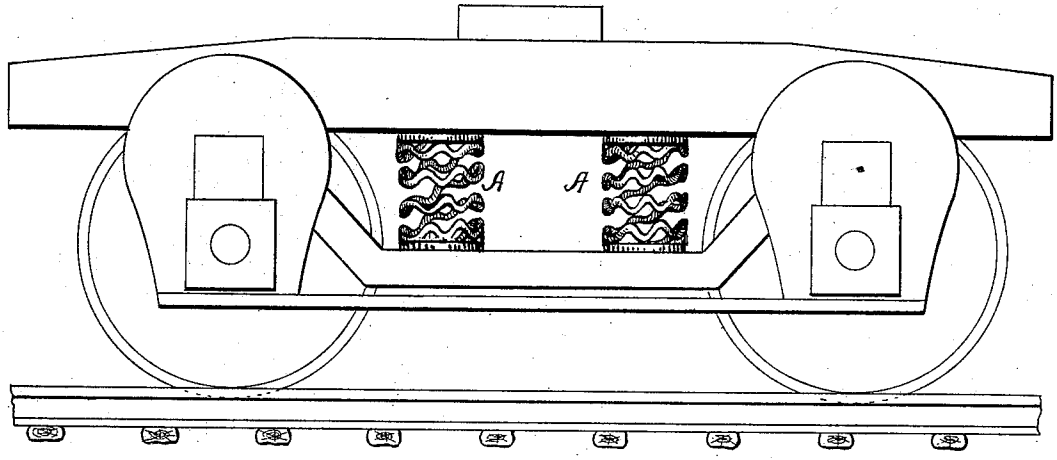


Fig. 2.

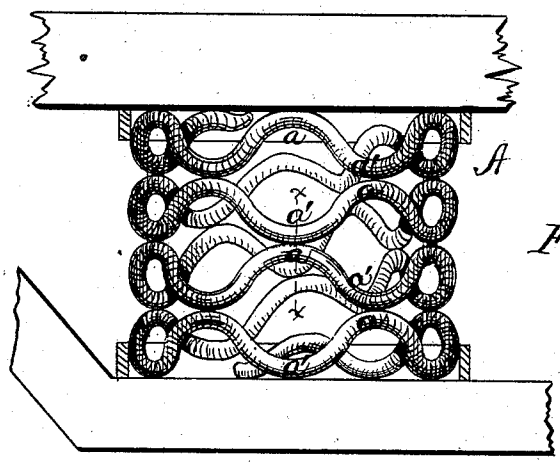


Fig. 3.

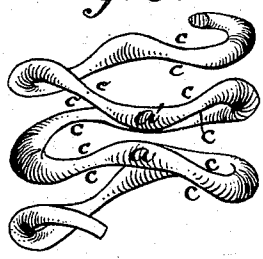


Fig. 4.

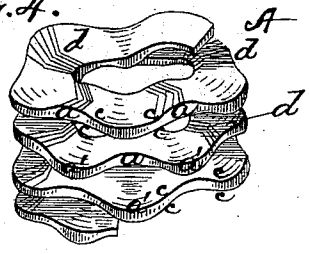
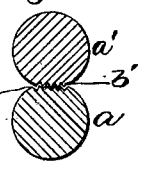


Fig. 5.



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S. ANDRAL KILMER, OF BINGHAMTON, NEW YORK.

SPRING.

SPECIFICATION forming part of Letters Patent No. 361,298, dated April 19, 1887.

Application filed February 24, 1887. Serial No. 228,756. (No model.)

To all whom it may concern:

Be it known that I, S. ANDRAL KILMER, a citizen of the United States, residing at Binghamton, in the county of Broome and State of New York, have invented certain new and useful Improvements in Springs; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

Figure 1 represents a side view of a car-truck, showing one use of the invention; Fig. 2, a detached spring compressed; Fig. 3, a modification; Fig. 4, another modification; Fig. 5, a section on line *x x*, Fig. 2.

This invention relates to improvements in springs, more particularly spiral springs in which the spirals are of the same diameter—that is, cylindrical spiral springs. While such spiral springs possess great resiliency and are very efficient for cushioning heavy loads, still they possess a material defect which affects very much their availability, especially in such places as passenger-cars on railroads. When a very heavy load is superimposed upon the ordinary spiral spring and pressure or strain is then brought to bear, the spring is compressed and the spirals bear against one another. The spring then becomes solid, there is no elasticity further, and as the spirals thus touch there is a dead shock. Various attempts have been made to overcome this defect. Nests of springs have been arranged for one to take the shock before another is driven home; also, rubber blocks have been placed with the spiral springs for the same purpose.

It is the object of this invention to retain all the advantages of these spiral springs, and yet give such a quality to the spring that the spirals will not be forced home and there will be no consequent dead shock.

It is a fact well known in the employment of elastic media to absorb jars and shocks that the old elliptic spring is, perhaps, the easiest, while the spiral spring is the firmest. With the present invention a spring is produced which possesses the good qualities of both these kinds of springs, the efficiency of one supplementing that of the other.

To this end the invention consists in a spiral spring having the peculiarities of construction hereinafter set forth.

In the annexed drawings, the letter A indicates a spiral spring in which the spirals are of the same diameter—that is, a cylindrical spiral spring. This spring may be made of round shape in cross-section, as shown, or of any of the shapes that are well known. This spring is made in curves *a a'* lengthwise of its circular length, making it wavy, as shown, *a* representing the crest, and *a'* the trough or hollow of the wave. On the tops of the curves *a* and the bottoms of the curves *a'* are made lengthwise of the spiral several scores or grooves, *b b'*, those of one spiral being immediately above those of the spiral below. When the spring is compressed and the curves *a* contact with the curves *a'* above them, these scores interlock and prevent the spirals from slipping past each other sidewise. When the spirals thus come home, as shown in Fig. 2, the spring is converted into a number of elliptic springs by the correlation of the curves *a a'* in pairs, as shown in Fig. 2. This invention, therefore, produces a spiral spring which, when the spirals are compressed home, is converted into a number of elliptic springs, which come into action as elliptic springs after the spring ceases to act as a spiral spring. It is therefore evident that after the full efficiency of the spring as a spiral spring is absorbed, then the elliptic springs come into play, utterly preventing any dead shock.

In Fig. 3 is shown a modification of this spring. Here the metal is thinned out on both sides of the spring, as at *c c*, in between the curves or bearing-points. This of course gives greater elasticity between these bearing-points and adds to the efficiency of the spring when the spirals are closed, rendering the elliptic action more palpable.

In Fig. 4 is another modification. Here the spiral is a flat instead of a round bar, being a plate made wavy of its circular length. This form may have the thinned portions like that in Fig. 3, or may be without them. This form of spring is especially adapted for axles and

journal-bearings, to take the end-thrust of wheels. In this form the scores are made angular, as they will catch better, as at *d*.

Having described my invention, what I claim is—

1. A combined spiral and elliptic spring in one piece, as set forth.

2. A spiral spring having the curves *a a'* and the scores *b b'*, as set forth.

3. A spiral spring wavy in the direction of its circular length and having the thin portions between the crest and hollow of the wave, as set forth.

4. A spiral spring wavy in the direction of its circular length and having on its curves the scores, as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

S. ANDRAL KILMER.

Witnesses:

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