H. GARDINER.
Car-Springs.

No. 200,610. Patented Feb. 26, 1878.

Fig: 1.

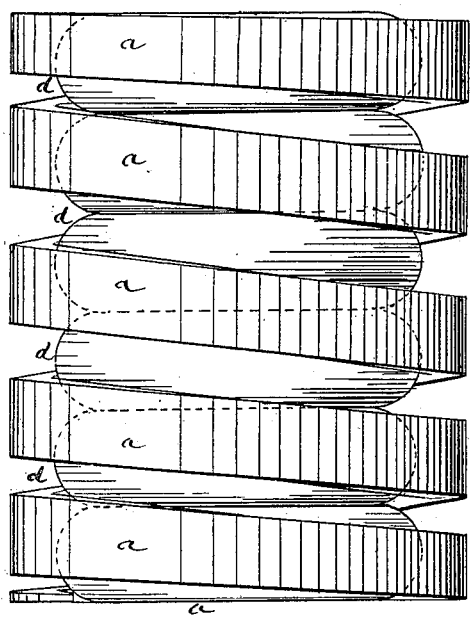


Fig: 2

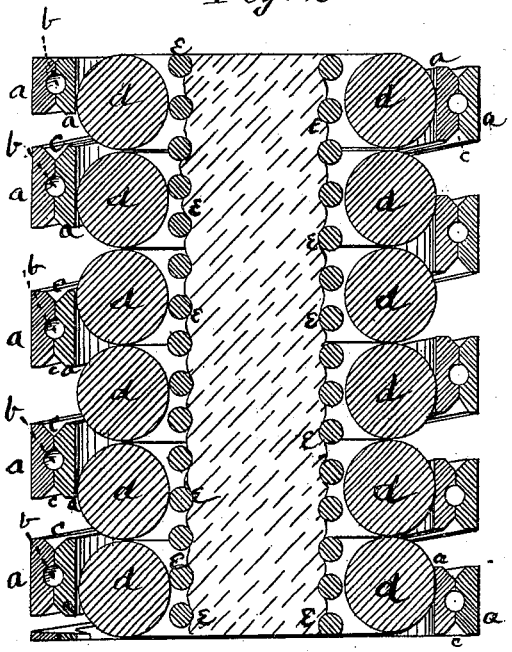
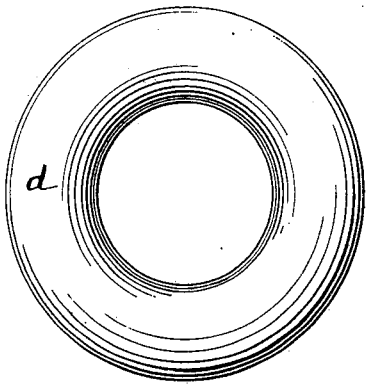


Fig: 3



Witnesses:
Frank E. Mangan
Audley J. Mooney

Inventor:
Herman Gardiner

UNITED STATES PATENT OFFICE.

HEMAN GARDINER, OF NEW YORK, N. Y.

IMPROVEMENT IN CAR-SPRINGS.

Specification forming part of Letters Patent No. **200,610**, dated February 26, 1878; application filed July 9, 1877.

To all whom it may concern:

Be it known that I, HEMAN GARDINER, of the city, county, and State of New York, have invented new and useful Improvements in Springs suitable for Railroad-Cars and other uses, of which the following is a specification:

My invention has reference to that class of springs composed of steel spiral coils and rubber, acting as an auxiliary or cushion to the spirals; and my invention consists, first, in the peculiar construction of the parts which, when put together, form the exterior spiral coil of the spring; secondly, in the peculiar form and arrangement of the rubber cushions, which operate as auxiliary to the spirals; and, thirdly, in the combination of the parts as a whole, with reference especially to forming a railroad-car spring.

In the accompanying drawings, Figure 1 represents a side elevation of my spring; Fig. 2, a vertical cross-section through the center of the same; Fig. 3, a plan view of one of the india-rubber rings which are used in combination with the steel spiral.

In all the figures similar letters represent similar parts.

The exterior spiral coil of my spring is constructed in the following manner: I take two strips of steel, suitable to the size and strength of the spring required, and of such length as, when coiled, to form a spring of the required height. These strips are rolled out so as to correspond in size and shape to each other externally and internally, and so that when the two are put together they constitute the body of the exterior spiral spring. The form of these strips, when rolled and when put together, is shown in the cross-sections of the spiral in Fig. 2, *a a* being the two parts, having on their interior faces semicircular grooves, corresponding to each other, and which, when the two are put together, form the circular groove *b*, extending the length of the coils. The interior faces of these strips are beveled at the upper and lower edges in the rolling, as shown at *c*, Fig. 2. This beveling is for the purpose of attaining as much lightness and saving in the material as may be consistent with unimpaired strength.

Within the circular groove *b* I place a circular steel rod, of corresponding size with the groove, and which runs the length of the steel through all the coils. It fills the space *b*, and may be represented in the drawing by that space.

Before the coiling operation is performed, the strips *a a* and rod *b* are placed together, and the ends of *a a* are heated and welded together, so as to fix the ends firmly to each other, between which, at the ends of the rod, which are secured and held within by the welding of these ends to *a a*, so that the rod operates by extension or contraction, and is, in fact, a tensive as well as elastic rod. The parts thus prepared are then coiled into the spiral spring, as shown at *a* in Fig. 1, on the exterior face, and in Fig. 2, at *a b c*, as to the interior form. The ends of the spiral and of the rod are brought to a flat surface, so that the top and bottom of the spring will be parallel and perpendicular to the axis of the spring.

The rubber portion of the spring is composed of a series of similar rings, *d*. (Shown in plan in Fig. 3 and in cross-sections in Fig. 2, and in elevation in the partly-dotted lines in Fig. 1.) These rings *d* are placed one upon another, and are of such dimensions as to fit closely within the core of the spiral, and be held there by the pressure. They are in number equal to the number of coils, and their thickness should about equal the width of the spiral bar. The outer surfaces of the two upper and lower rings should be flush with the top and bottom of the end coils of the spiral *a*.

Within the rings is inserted the small steel spiral spring *e*, extending the length of the spring, and the core of which may be packed with felt or cotton, or other material suitable for acting as a cushion.

The peculiar construction of the exterior spiral, as described, secures the advantages of being easily rolled, with diminished liability to straining in the coiling; it is more easily and uniformly tempered throughout; and it is lighter in material, as compared with springs made solid of similar power. The rubber portion of the spring, being divided into sections, as described, and of the ring form, not only affords space for the bulging of the rubber under pressure, but the rings are very easily and cheaply constructed, and can be repaired

with facility and cheapness by simply substituting a fresh ring for one that may have become injured.

The spring, as a whole, possesses all required elasticity and ease of action, and also great strength and security against fracture or injury from the strain and shocks which railroad-car springs are subjected to.

Having thus described my improved spring and the manner of constructing the same, what I claim therein as my invention, and desire to secure by Letters Patent, is—

1. The exterior spirally-coiled compound steel spring, composed of the parts *a a b*, welded together at their ends, and the ends of *b* secured by and within the welding, constructed, arranged, and operating substantially as set forth.

2. The rubber rings *d*, in combination with the exterior steel spiral, constructed and arranged and operating substantially as set forth.

3. The spring above described, composed of the several parts *a b c d e*, combined, arranged, and operating substantially as set forth.

HEMAN GARDINER.

Witnesses:
FRANK E. MORGAN,
AUDLEY J. MOONEY.