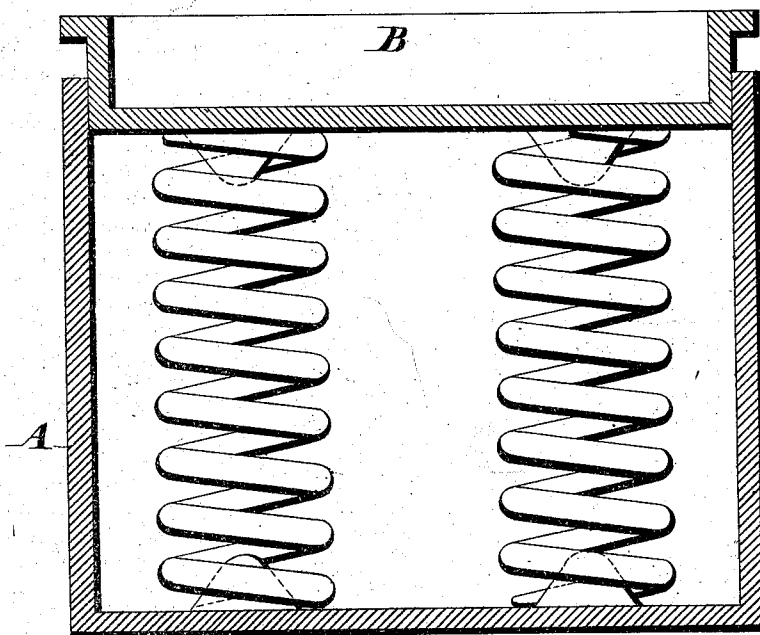


N. MIDDLETON & A. MIDDLETON, Jr.

Manufacture of Car-Springs.

No. 135,929.

Patented Feb. 18, 1873.



WITNESSES { *Thomas M. Swain*
Harry Smith

Nathan Middleton
Allan Middleton Jr.
By their attys
Howson & Son

UNITED STATES PATENT OFFICE.

NATHAN MIDDLETON AND ALLEN MIDDLETON, JR., OF PHILADELPHIA, PA.

IMPROVEMENT IN THE MANUFACTURE OF CAR-SPRINGS.

Specification forming part of Letters Patent No. **135,929**, dated February 18, 1873.

To all whom it may concern:

Be it known that we, NATHAN MIDDLETON and ALLEN MIDDLETON, Jr., of Philadelphia, Pennsylvania, have invented an Improvement in Car-Springs, of which the following is a specification:

Our invention relates to that class of car-springs, in which groups of spirals are used as elastic mediums; and the object of our invention is economy in the manufacture and an increased durability and efficiency of springs of this character. We attain these objects by making the elastic medium of the spring of untempered spirals of cold-drawn or cold-rolled Bessemer steel, or steel of a texture analogous to that which is known as Bessemer steel.

Car-springs of the class to which our invention relates have heretofore contained spirals either of iron wire or of tempered steel. In car-springs having iron-wire spirals as an elastic medium, dependence has been placed upon a large number of such spirals in each spring, the wire of each spiral being of small diameter, three sixteenths of an inch or thereabout, but in applying these springs they were generally limited to freight-cars owing to their restricted elasticity. In making car-springs containing steel spirals, the practice has been to coil heated rods of steel of from one-quarter of an inch to half an inch in diameter, and then harden and temper the spirals, a process both tedious and expensive, for, independent of the necessary manipulation which it demands, it is a difficult matter to impart a uniform degree of temper to the spirals, many of them proving to be defective on being properly tested, and others, apparently perfect, being likely to break under the repeated shocks and strains to which they are subjected when applied to railway cars.

After many experimental tests we have found that a car-spring possessing the desired permanent elasticity can be made with an elastic medium consisting of untempered spirals of cold-drawn or cold-rolled steel, the cold-rolling or cold-drawing so condensing the fibers of the metal as to impart a toughness to the same which cannot be acquired by the

usual process of hardening and tempering. The cold-drawn rod is coiled in a cold state, so that after the spiral is complete the metal retains its toughness and the coil possesses the desired elasticity without that danger of being broken to which tempered spirals are liable; we have, for instance, made spirals of cold-drawn steel rods, having a diameter of three-eighths of an inch, the coils themselves having a diameter of two inches.

In the accompanying drawing, representing a vertical section of a car-spring, A is a cast-iron box containing, in the present instance, four spirals made of cold-drawn Bessemer-steel wire, the spirals being retained in place by a cover, B.

It is immaterial how many spirals are used in each spring, for the size of the spirals and their number will depend in a great measure whether the spring has to be used as a bumper, draw, bolster, or bearing spring; nor is it material how the coils are retained in groups so as to constitute a self-contained spring.

It may be remarked that in manufacturing the spirals we prefer to make the coils wide apart in the first instance, and afterwards to bring them closer together by compression.

We prefer to use Bessemer steel owing to its tough nature, but there is other steel of analogous character, which can be cold-drawn or cold-rolled, and can be bent while cold into the desired spirals, which form a most efficient and economical elastic medium for car-springs.

We claim as our invention—

The improvement described in car-springs and in the manufacture thereof—that is to say, a spring composed of a number of spirals of Bessemer or homogeneous steel wire, cold-drawn or cold-rolled, and coiled while cold, as herein set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

NATHAN MIDDLETON,
ALLEN MIDDLETON, JR.

Witnesses:
WM. A. STEEL,
HUBERT HOWSON.