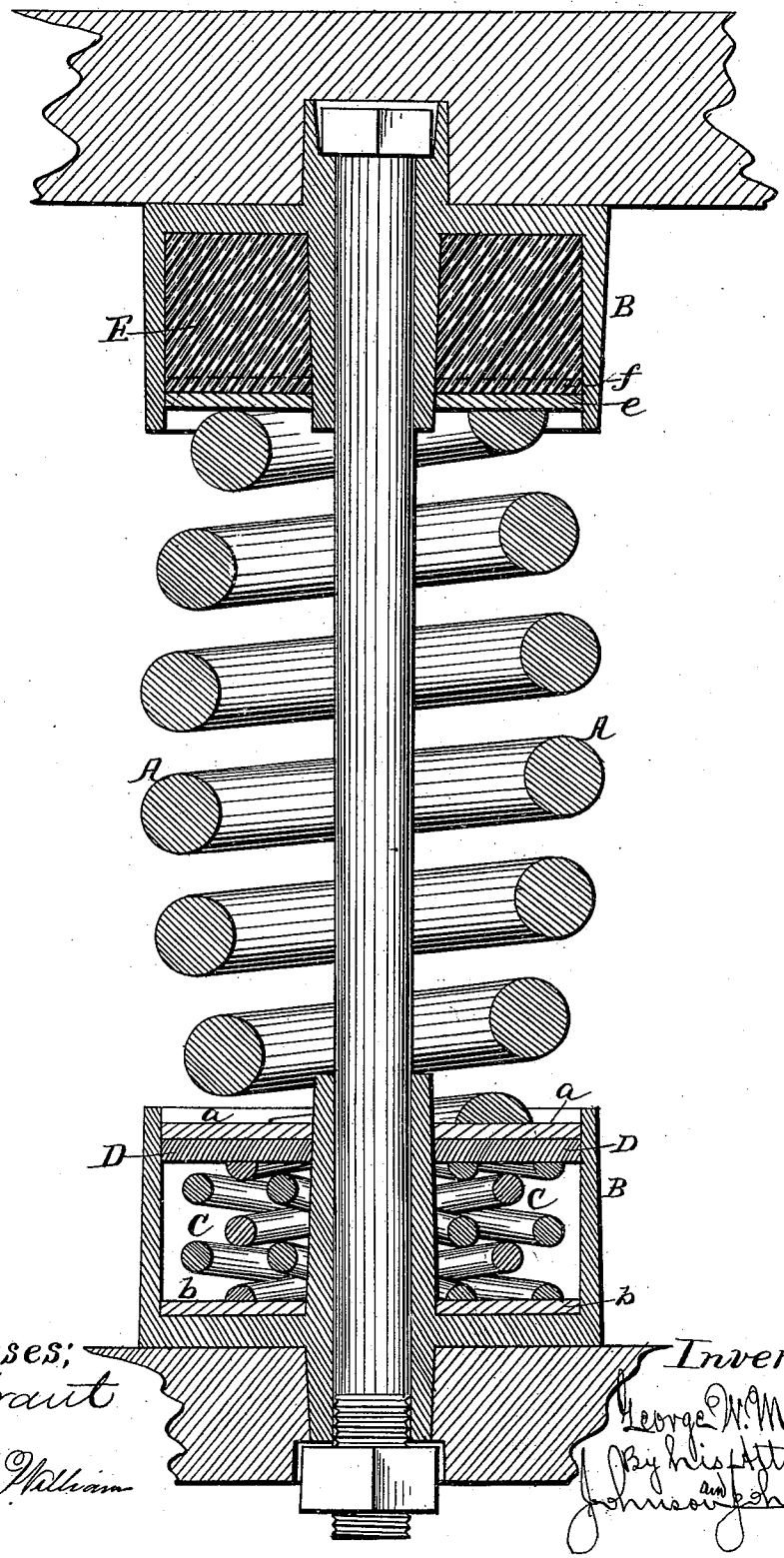
(No Model.)

G. W. MORRIS.

CAR SPRING.

No. 355,197. Patented Dec. 28, 1886.



Witnesses:
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UNITED STATES PATENT OFFICE.

GEORGE W. MORRIS, OF PITTSBURG, PENNSYLVANIA.

CAR-SPRING.

SPECIFICATION forming part of Letters Patent No. 355,197, dated December 28, 1886.

Application filed July 23, 1886. Serial No. 208,849. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. MORRIS, a citizen of the United States, residing at Pittsburg, in the State of Pennsylvania, have invented new and useful Improvements in Car-Springs, of which the following is a specification.

My invention relates to coiled springs particularly adapted for street-cars; and the objects of my improvements are to produce a combined graduated, equalizing, and carrying spring, to isolate the carrying-spring from metal contact to prevent the transmission of sudden shocks and jars directly to the body of the vehicle, to prevent rattling of the spring, and produce a soft and durable spring having a graduated equalizing action under different loads. In carrying out these objects I use a carrying-spring made of round steel of uniform thickness throughout its length, coiled so that its ends will be of less diameter than its middle coils, producing what is known as a "graduated spring" of barrel form, having its greatest strength at its ends and the least resisting force in its middle coils. The carrying-spring thus made is supported upon a nest of springs inclosed within a malleable-iron ring-box. The seating for both ends of the carrying-spring is of non-metallic substance, so that the spring has no metal bearing upon its housings, and is cushioned at one or at both ends.

The accompanying drawing represents my improved spring in vertical section.

I prefer to make the carrying-spring A keg shape, of a steel bar of round form of uniform thickness throughout its length, and coiled spirally, so that its end coils will be of less diameter than its middle coils, whereby the spring will be strongest at its ends and weakest in its coils of greatest diameter, so that as the coils decrease in diameter their strength or resisting power increases. This construction, in connection with the round form of the bar, gives a powerful graduated coil-spring. This round-bar graduated spring carries the load, however great; and, for the purpose stated, I combine with such keg-shaped spring a cushion at one or both ends, inclosed in a fixed housing, for the purpose of producing a soft action in a powerful spring and receiving the shocks of jars and preventing their direct transmission to the carrying keg-shaped spring, and thus give the body an easy movement and relieve it from sudden vibrations or shocks, which are caused by bad joints in the rails, stones, or other obstructions. The housings for the cushions may consist of a ring-box, B, open at one end and fixed in its relation to the carrying-spring—that is, it does not move with it. The lower end cushion may be formed, as shown, by a group of two or more steel springs, C, preferably coiled in different directions, of the same or of unequal height, placed within the ring-box, and separated from the carrying-spring by a metal follower, D, confined within said box and resting upon said group of springs.

The carrying-spring is separated from the follower-plate by a non-metallic substance, *a*—such as rawhide—while the group of springs in the box is separated from the latter by one or more sheets of rawhide or similar substance, *b*. The follower may also be separated from the group of springs by rawhide, so that there will be no contact of the springs with the metal follower or with the box or with the spring. A rubber cushion, E, is seated within the upper box, and forms the bearing for the upper end of the carrying-spring, and I may use a facing, *e*, of rawhide, for such bearing.

The end coils of the keg spring are flattened in the usual manner to give suitable end bearings. This construction gives a very easy action to a powerful spring, and produces a practically soft and noiseless spring. Both the end cushions may be alike; but I prefer to use a top rubber cushion and a bottom group of springs, as giving the best results. The rawhide seating for the springs, while it deadens the noise, forms a hard seating for the springs, and two or more sheets may be used for the purpose. They are confined in the boxes, and when used with a rubber cushion a follower-plate, *f*, may be placed between them and the cushion, as shown by the dotted lines, so as to give greater firmness to the bearing for the spring.

An important feature of my improvement is the combination of the keg-shaped spring formed of round steel with end cushions in such manner that the end coils of the keg-shaped spring follow the compression of the cushions within the top and bottom housing-

cups, so that the end coils of the spring do not come in contact with the boxes, and the latter are not therefore liable to be broken or the spring crushed by the housing.

Under loads of very great weight the end coils of the carrying-spring afford the necessary yielding or elastic resistance, while the middle coils will yield under a less weight, and the end cushions will yield under a still less weight, so that the spring will under any weight give a soft yielding action to the car at three points.

The boxes may be connected in any suitable way to the car-timbers, and to the iron frames and rods beneath the car in any suitable manner, and the boxes and carrying-spring may be bolted together in any suitable way, and when so secured the bolt passes through tubular central bearings in each box, and is secured by a nut at the bottom.

The keg form of spring is old, and a graduated spring formed of a bar of equal and of unequal thickness is old. End cushions, both of coiled and of rubber springs, have been combined with carrying-springs of uniform diameter and of tapering form, and such cushions have been placed at the top or at the bottom of the carrying-spring and at the middle of a carrying-spring of two vertical sections, one upon the other, and these things I do not claim; but the keg-shaped spring formed of a round bar of uniform thickness has never, so far as I know and can find, been used with end cushions, and particularly with an end-sustaining spring composed of a group of coil-springs separated from the carrying-spring by metal and rawhide followers, so as to act with the middle coils of the keg-shaped spring to produce a more perfect equalizing action by the co-operation of its end cushions and middle coils.

In my new combination-spring I use one of the best known and most powerful forms of carrying-spring having in such form an equalizing action under different weights, with end cushions having equalizing functions, and thus produce a single soft-acting spring having its greatest resisting power at its ends supplemented by its least resisting power, with a non-yielding flexible bearing separating the parts of different resisting forces.

The employment of rawhide or untanned leather as seatings for the carrying-spring forms a flexible, hard, and tough body interposed between the spring and its end cushions, so that the latter can be made of a nest of coiled springs or of a rubber cushion. When of the latter, the rawhide or similar material prevents the end spring-coils from sinking into the rubber, and when such cushion is formed of coiled springs the rawhide in several thicknesses is placed between the carrying-spring and the cushion-springs, and it may be re-enforced by a metal follower; but the bearings of the carrying-spring are formed by the rawhide, which deadens the noise while forming an unyielding bearing upon a cushion.

I claim—

1. An improved car-spring, consisting of the graduated keg-shaped spring, a cushion for one or both ends of said spring, a flexible non-yielding seating for the latter, and a fixed housing for said end cushion, substantially as described, for the purpose specified.

2. A keg-shaped spirally-formed spring of a round steel bar of uniform thickness, in combination with an end cushion consisting of one or more coiled springs, a flexible non-yielding seating for the keg-shaped spring and for the cushion-springs, and a fixed housing for the latter, substantially as described, for the purpose specified.

3. An improved car-spring, having, in combination with a keg-shaped spiral spring, cushions for one or both ends thereof, the flexible non-yielding seatings, and a re-enforcing follower-plate for said seating inclosed in a fixed band-housing, B, substantially as herein set forth.

4. The combination of a carrying-spring with the rawhide seating therefor and the housings, substantially as described, for the purpose specified.

5. The combination of a carrying-spring, A, with the end springs, C and E, the housings B, the rawhide bearings *a*, *b*, and *e*, and the metal follower D, as herein shown and described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

GEO. W. MORRIS.

Witnesses:

WILLIAM BEAL.

GEO. B. MOTHERAL.