A. MIDDLETON.

CAR-SPRING.

No. 190,061. Patented April 24, 1877.

Fig 1

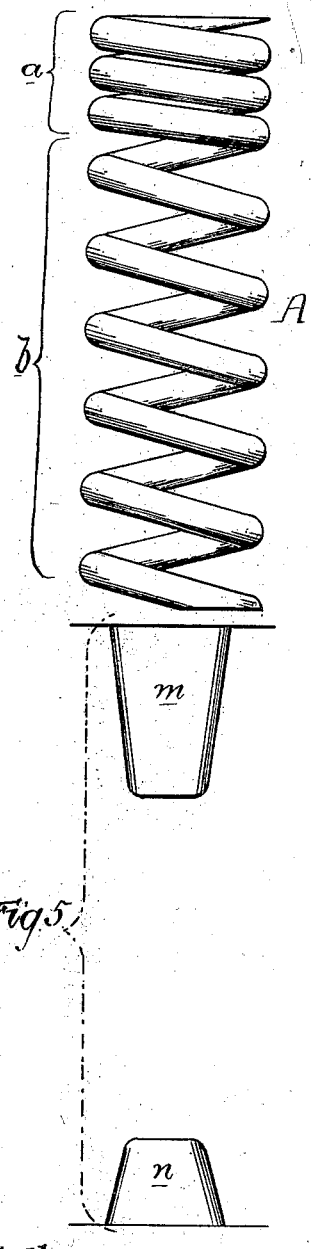


Fig 5.

Fig. 6

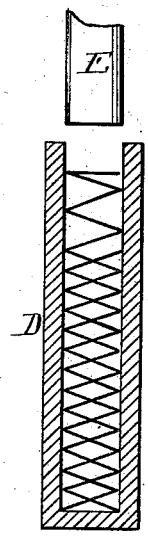


Fig. 3.

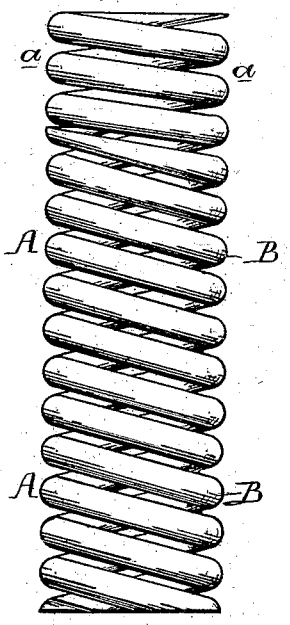


Fig 2.

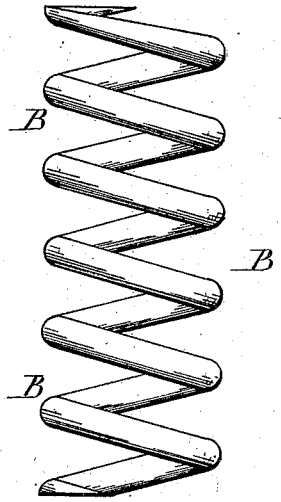
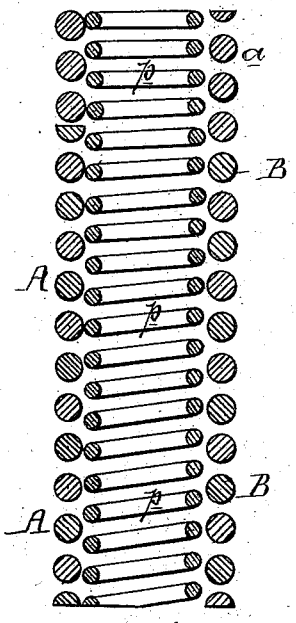


Fig. 4.



Witnesses.

Harry Smith

John A. Rupertus.

Inventor Allen Middleton

by his Attorneys.

Howson and Sons

UNITED STATES PATENT OFFICE.

ALLEN MIDDLETON, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN CAR-SPRINGS.

Specification forming part of Letters Patent No. **190,061**, dated April 24, 1877; application filed February 7, 1877.

To all whom it may concern:

Be it known that I, ALLEN MIDDLETON, of Philadelphia, Pennsylvania, have invented a new and useful Improvement in Car-Springs, of which the following is a specification:

My invention relates to that class of car-springs in which a number of spirals are contained in a box or case, or are confined between spirals; and the object of my invention is to make duplex differential spirals having proper resiliency and strength under both light and heavy loads, and at the same time so compact that a group of the spirals will occupy less space than those of the ordinary construction.

In the accompanying drawing, Figures 1 and 2 represent the two parts of the spiral detached from each other; Fig. 3, a view of the two spirals in their proper relative positions; Figs. 4 and 5, views illustrating two modes of maintaining the two parts in their proper lateral position, and Fig. 6 a diagram illustrating a mode of manufacturing the spirals.

A and B represent the two coils of the duplex spiral, both being composed, in the present instance, of round wire.

The pitch of the upper portion *a* of the coil A is one-half of the pitch of the lower portion of the same coil, and the pitch of the coil B is exactly the same as that of the lower portion of the coil A, so that by applying one end of the former to the lower end of the latter, and turning one or both in the proper direction, one coil will be screwed into the other, and the result will be a compound or duplex differential spiral, as shown in Fig. 3.

Under a light load the long coil A will be the supporting medium, but a heavy load will be resisted by both long and short coils.

The compound or duplex spring, while it has the proper resiliency for both light and heavy loads, is of unusual strength compared with its size; hence, the proper strength and resiliency of a spring having been determined, a less number of the duplex spirals will be required to make it than of the ordinary spirals, and therefore a more compact spring must be the result of my improvement.

The two coils may be maintained in their proper relative position by projections on the top and bottom of the box containing a group of the spirals, the projections *m*, Fig. 5, being long enough to extend into the spiral below the upper end of the short coil, and a shorter projection, *n*, being on the bottom of the box.

I prefer, however, to maintain the two coils in their proper lateral position by an internal re-enforcing spiral, *p*, Fig. 4, which may be as long as, or shorter than, the compound spiral, providing it be longer than the inner coil.

There may, if desired, be two or more internal re-enforcing spirals.

In making the spiral of rolled bars of tempered steel, I coil the bar while hot around a spindle having a spiral groove to determine the pitch of the coil, but in making the coils of cold iron or steel wire I adopt the plan shown in Fig. 6.

The wires for both coils are first made of the same large pitch, and are, of course, much longer than the finished spiral.

These coils are then placed together in a box, D, and a ram, E, adopted to the box is caused to descend with such force as to compress the coils metal to metal. On raising the ram the compound spiral will recoil to the condition shown in Fig. 3, and will be complete, the proper differential pitch having been imparted to the coil A by the above operation of compressing both coils together.

It should be understood, however, that I do not desire to claim this mode of making the springs in the present application, but reserve this for a separate application for Letters Patent.

I claim as my invention—

1. The within-described duplex differential spiral, consisting of the coil A, having different pitches, and the shorter coil B, having a pitch corresponding with that of a portion of the coil A, all substantially as set forth.

2. The combination of the duplex differential spiral, with one or more re-enforcing internal spirals, as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ALLEN MIDDLETON.

Witnesses:

HERMANN MOESSNER,

HARRY SMITH.