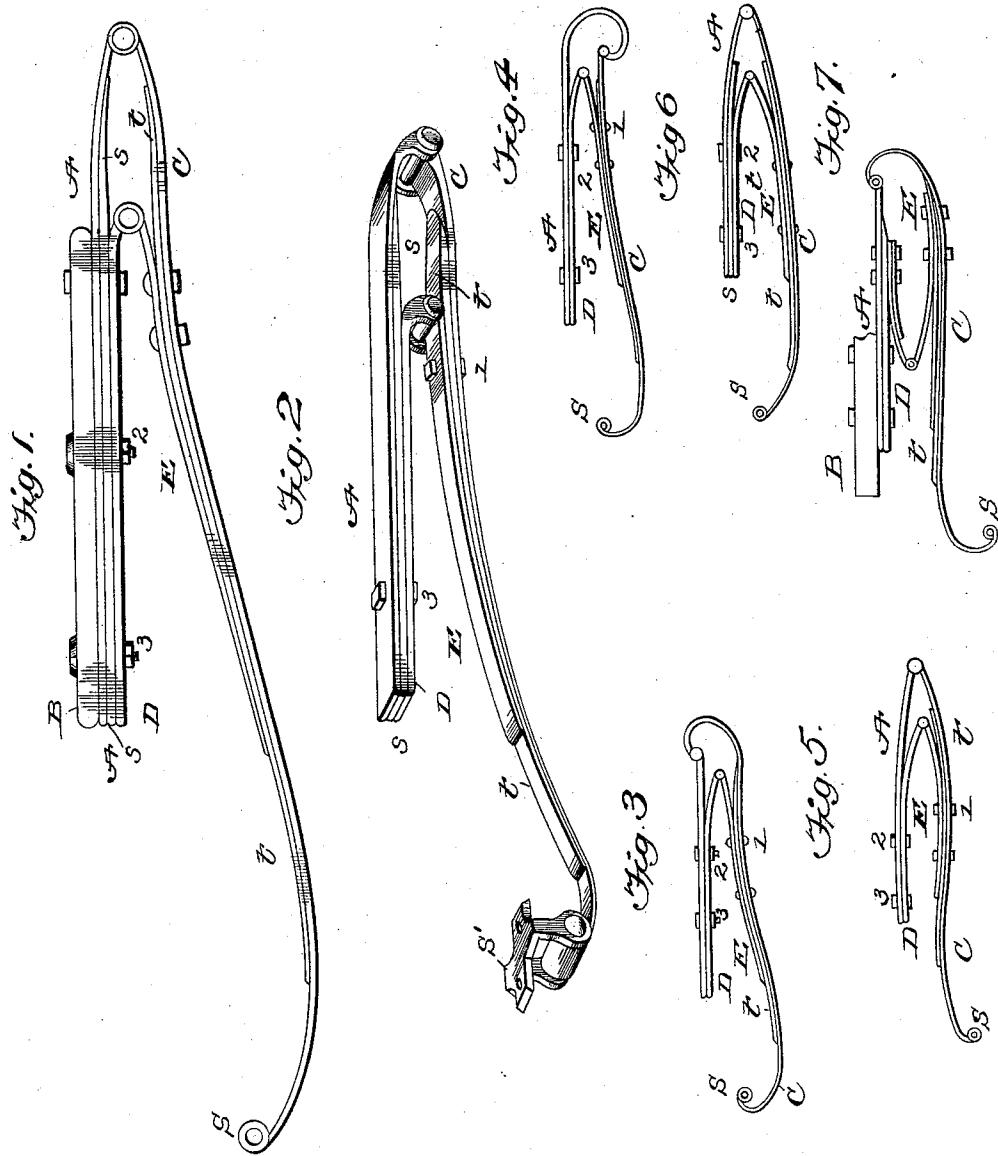


C. A. BEHLEN.  
VEHICLE SPRING.

No. 487,598.

Patented Dec. 6, 1892.



Witnesses

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*Robert Everett*

Inventor

*Charles A. Behlen.*  
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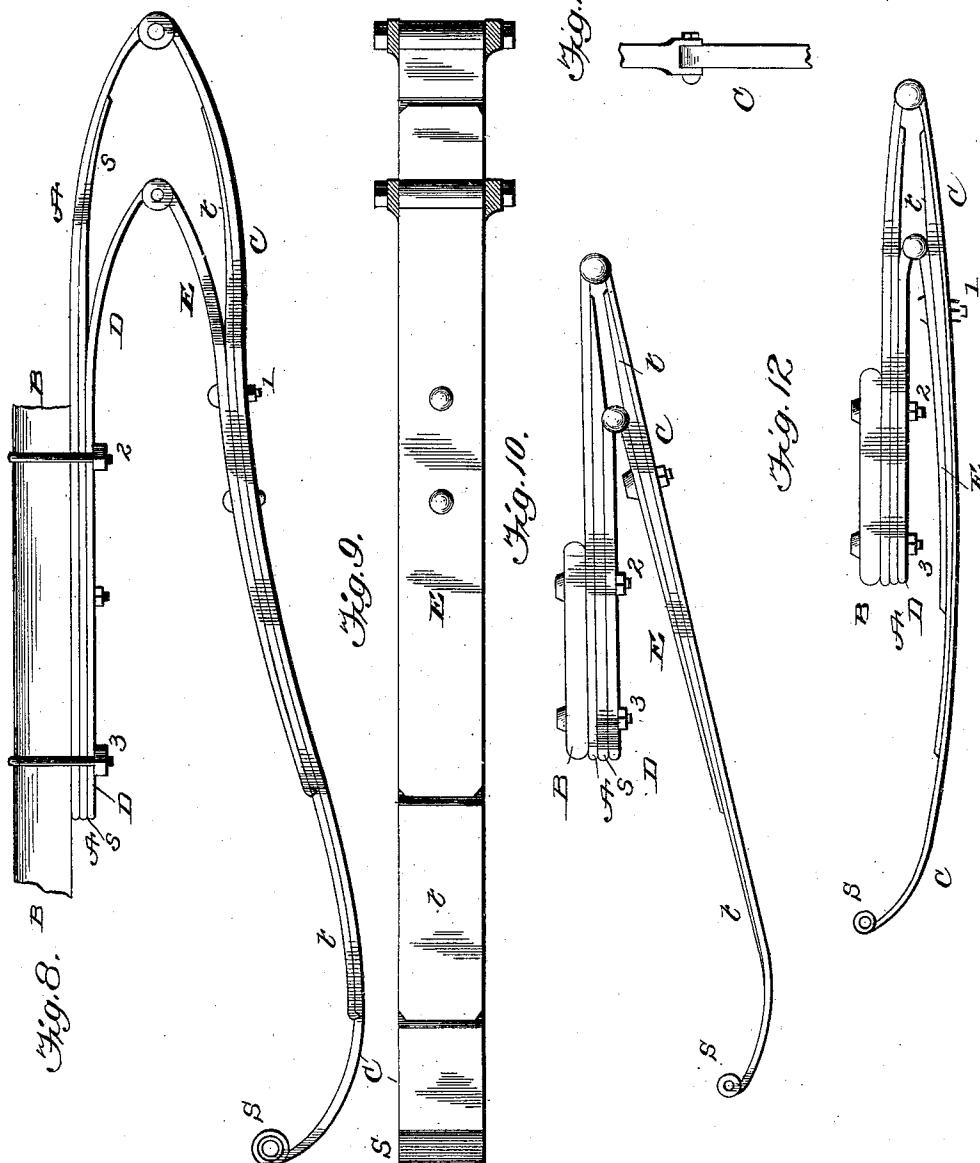
(No Model.)

2 Sheets—Sheet 2.

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# UNITED STATES PATENT OFFICE.

CHARLES A. BEHLEN, OF CINCINNATI, OHIO.

## VEHICLE-SPRING.

SPECIFICATION forming part of Letters Patent No. 487,598, dated December 6, 1892.

Application filed July 2, 1890. Serial No. 357,589. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES A. BEHLEN, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented a certain new and useful Improvement in Vehicle-Springs, of which the following is a specification.

The object of my invention is to produce a vehicle-spring which can be applied to the 10 different classes of conveyances now in vogue and whose action will be soft, easy, and sensitive, producing a comfortable movement without rebound, at the same time providing for strength and durability, thus guarding against 15 accidents from breakage and the resulting trouble and expense.

The feature of my improvement and its advantages as a whole will be understood from the description herein given and by reference 20 to the accompanying drawings, forming part of my application, in which—

Figure 1 is a side view of my spring. Fig. 2 is a perspective view of same; Fig. 3, a modified form of the above in that the leaves 25 forming the inner joint diverge from the outer section, the latter in turn at its jointure being provided with a curved sweep instead of being knuckle-jointed directly or in a line with one another. Fig. 4 is an inverted view 30 of Fig. 3. Fig. 5 shows the inner and outer parts single-jointed, the upper leaf of the inner section sweeping and diverging from the upper section, while its companion leaf remains adjacent, or nearly so, its length to the 35 lower outer section. This construction is best adapted for attachment to axle or head-block. Fig. 6 is merely a reversal of Fig. 5. Fig. 7 shows the jointure of the inner section reversed—as, for instance, to that of Fig. 3—40 viz., instead of being joined in the same direction as the outer end it is the opposite. Fig. 8 is an enlarged side view and represents a spring constructed substantially as in Fig. 1, only that the connecting-leaves of the inner section diverge from the inner portion of 45 the outer section and are not contiguous, as in the first figure. Fig. 9 is a top view of Fig. 8. Fig. 10 is a side view showing a construction substantially similar to Fig. 1, only that 50 the leaves of the inner connected section are perfectly straight and in that position lie

contiguous to the other abutting positions. This view (as indeed do all the other views) represents the spring in its normal or unloaded condition. Fig. 11 is an end view of Fig. 5 55 10. Fig. 12 is a side view of a spring similar to that shown in Fig. 10, only that it shows the position the parts assume when weight is applied.

It may be here stated that the number of 60 leaves to a spring depends somewhat upon the weight which it is designed to carry. If the weight be light, the number of leaves is less, if the weight be great the number of leaves will be more to the spring. The proportion is left to the discretion and judgment of the constructor.

Similar letters and numerals of reference indicate corresponding parts in the drawings.

The letter A indicates the upper leaf, which 70 is attached by bolts or clips to the vehicle-bed, body-plate, spring-bar, or spring-plate, as the case may be, depending upon the construction of the vehicle.

In the drawings, B represents these parts. 75 The leaf A may be provided with eyed lugs or ears, as seen in the various figures. The outer leaf C of the lower section is provided with a barrel, which, as before stated, fits between the eyed lugs of plate A, the connection being firmly effected by means of a bolt and nut, as shown, or rivets may be employed for this purpose, if desired.

D is the inner plate composing the upper part of the inner section of my spring. E is 85 the lower inner plate of the lower section. These parts D and E correspond to the parts A and C of the outer section, their jointure at the ends being effected in the same way—viz., by a bolt and nut or by rivets, as shown. 90 This description applies more particularly to the construction of spring shown in Figs. 1, 2, 8, 9, 10, 11, and 12, though any of the modes shown in Figs. 3 to 7, inclusive, may be employed, if desired. The inner and outer sections of my spring are connected together by bolts and nuts, as 1 2 3, as shown, or clips, the number of such bolts and nuts or clips being according to the heft of the spring, which, as was heretofore stated, can be provided with 100 any number of intermediate leaves, as is desired. In the drawings I show only one such

intermediate leaf in the upper and lower sections, and designate such by the letters *s* and *t*, respectively.

The application of these springs to a vehicle depends somewhat upon the particular kind that is to be used. In a side-bar construction the attachment is to the head-block or spring-bar and side bar, respectively. In an end-spring construction the attachment is made to the head-block or bolster and body spring-bar or directly to the body. In a phaeton construction the front of the spring, which is designated by *S*, is attached to the bolster and the rear to the under side of the body, having an intermediate spring between the two side ones, which is attached below the axle, and so on, according to the construction.

The various parts having been pointed out, I will now proceed to explain the action of the spring as a whole. The initial movement takes place with the plate *A*, the ears of which move as on a pivot on the connecting bolt or rivet, which holds the lower section near the point of union. The parts or leaves expand, the rear portion at the same time being depressed. These movements affect the front end of the spring, that end which is attached to the side bar, head-block, or bolster, as the case may be, causing an undulation. Meanwhile the inner section is in action, their jointure acting as a fulcrum to the outer section, the movements of the inner leaves being affected correspondingly by those of the outer sections and simultaneously therewith, the result as a whole being that there is produced a spring which gives a gentle non-rocking easy motion without any disagreeable rebound, at the same time providing for strength and du-

rability--advantages which will be apparent to all.

What I therefore claim, and desire to secure by Letters Patent, is—

1. A vehicle-spring composed of outer sectional leaves pivoted to a common axial center at one end and two inner sectional leaves, each secured at one end within and to the outer leaves, with their opposite ends hinged to a common axial center, over which the outer leaves fulcrum or bend, substantially as specified.

2. A compound vehicle-spring formed of two outer curved leaves, leaves hinged at one end to a common axial center, and an inner spring formed of two leaves, each secured at one end within and to the outer leaves and hinged at the other end to a common axial center, both sets of springs being in coincident vertical planes, the outer leaves turning upon their common axial center and fulcruming over the said axial center of the inner leaves, substantially as specified.

3. A compound vehicle-spring formed of two outer leaves hinged at their spring ends to a common center, one end of said springs adapted to be rigidly attached to a vehicle, the opposite end adapted to be hinged to a vehicle, in combination with the inner spring formed of two leaves attached in coincident vertical planes with the outer springs at one end and the other ends being hinged to a common axial center, which serves as a fulcrum for both the inner and outer springs, substantially as specified.

CHARLES A. BEHLEN.

Witnesses:

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