(No Model.)

3 Sheets—Sheet 1.

E. STORM.

VEHICLE SPRING.

No. 344,216. Patented June 22, 1886.

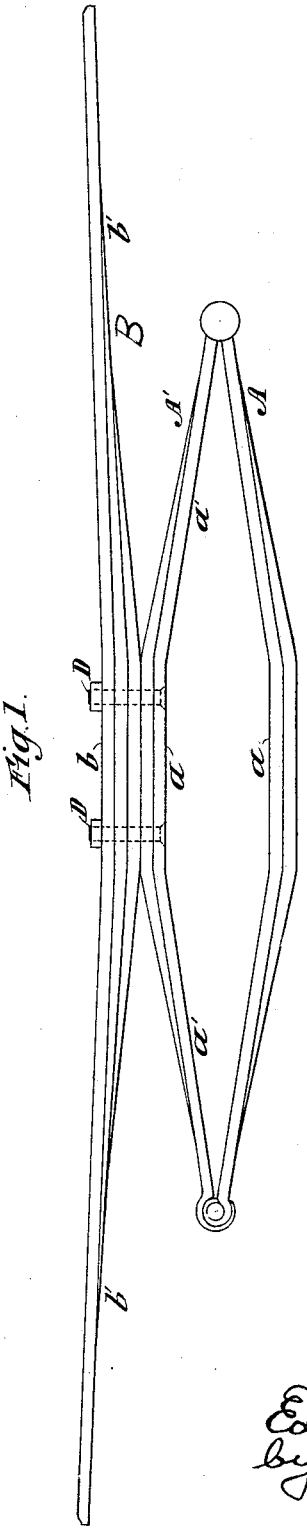

Fig. 1.

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(No Model.)

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Fig. 2.

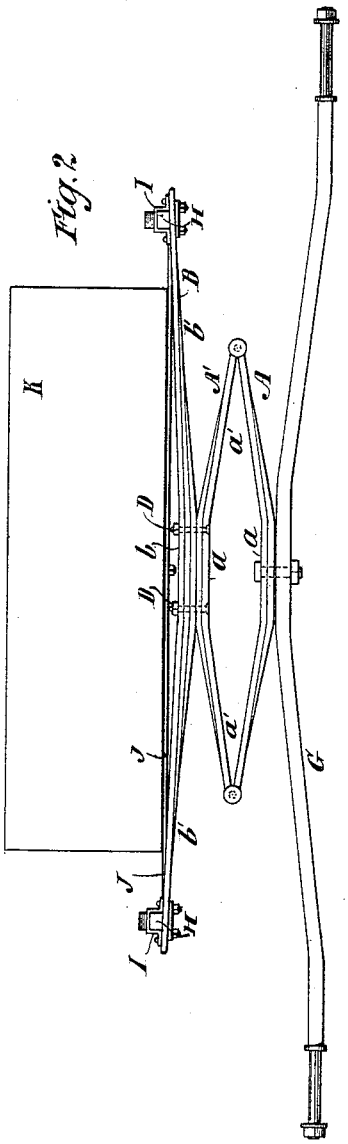
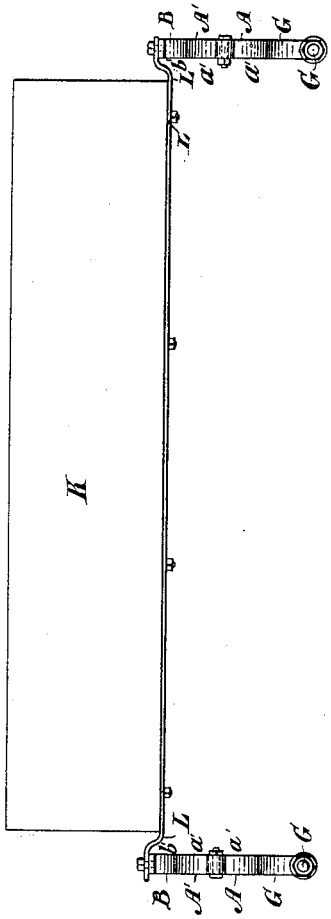


Fig. 4.



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(No Model.) 3 Sheets—Sheet 3.

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VEHICLE SPRING.

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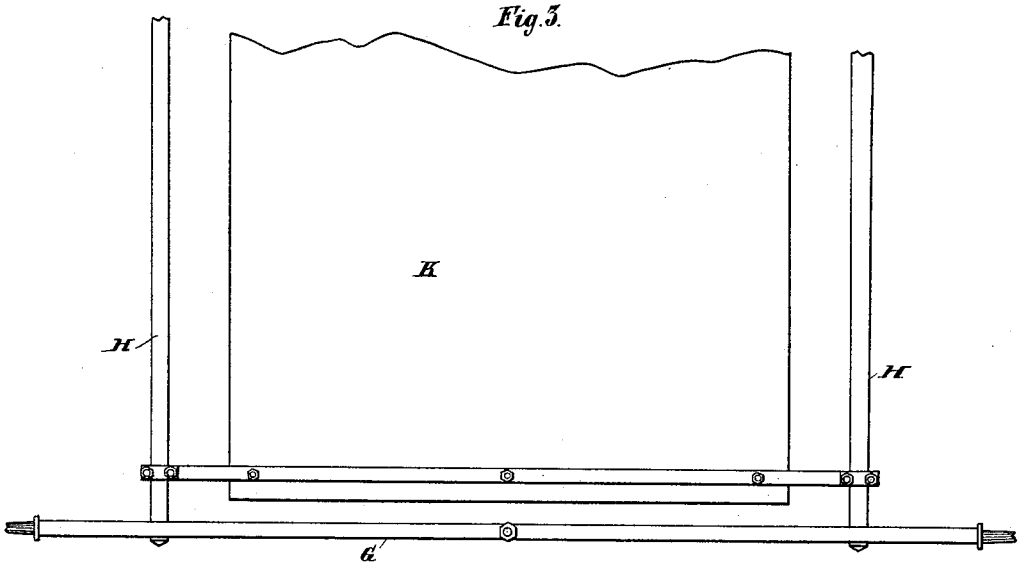
Fig. 3.



Witnesses:
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UNITED STATES PATENT OFFICE.

EDWARD STORM, OF POUGHKEEPSIE, NEW YORK.

VEHICLE-SPRING.

SPECIFICATION forming part of Letters Patent No. 344,216, dated June 22, 1886.

Application filed August 26, 1885. Serial No. 175,359. (No model.)

To all whom it may concern:

Be it known that I, EDWARD STORM, of Poughkeepsie, in the county of Dutchess and State of New York, have invented a certain new and useful Improvement in Wagons, Carriages, &c., of which the following is a specification.

My improvements relate to the means whereby wagon, carriage, and other vehicle bodies are supported from the running-gear of the carriages.

I will describe my improvement in conjunction with such parts of a carriage as are necessary to an understanding of the improvement, and then point out the various features of the improvement in claims.

In the accompanying drawings, Figure 1 is a view of a combination of springs forming part of my improvement. Fig. 2 is a front elevation illustrating the application of the combination of springs shown in Fig. 1 to a side-bar wagon. Fig. 3 is an inverted plan of the parts shown in Fig. 2. Fig. 4 is a view showing how the combination of springs illustrated in Fig. 2 may be applied to another kind of wagon.

Similar letters of reference designate corresponding parts in all the figures.

I will first describe my improvement as it is illustrated by Figs. 1, 2, and 3.

A A′ designate a spring consisting, essentially, of two sections, A A′, which are a considerable distance apart at the middle, converge toward the ends, and there have hinge-connections. Each section may be composed of any desirable number of leaves. The hinge-connections are formed by bending the ends of the principal leaves of the sections into circular form—one outside the other—and passing bolts C through them. This spring is somewhat like what is ordinarily known as an "elliptic spring;" but it differs from such a spring in many important particulars. Each of its sections has a flat central portion, *a*, and straight inclined portions *a′*, extending therefrom. The inclined portions of the two sections converge toward each other. The ends of the opposite main sections, just inward of where they bend into circular form around the bolts C, extend into contact or close proximity. In respect to the shape of the sections it possesses advantages over the ordinary elliptic spring. I shall be better able to show these advantages later.

B designates another spring composed of any desirable number of leaves. It has a central flat portion, *b*, and straight upwardly-inclined portions *b′*. The flat portions *b* of the spring B is secured in contact with the flat portion *a* of the section A′ of the spring A A′ by bolts D, passing through holes, or by any other suitable means. The spring B is considerably longer than the spring A A′. One pair or combination of springs, A A′ and B, is arranged between each axle G of a wagon and the side bars, H, thereof. The springs which are over the rear axle are secured to that axle by clips passing around the axle; but the springs which are over the front axle are shown as secured thereto by a bolt passing through the section A of the spring A A′ and this axle, as may be seen in Fig. 2. The ends of the springs B are secured to the side bars, H, by clips I, or otherwise.

The wagon-body K may be supported from the side bars, H, in any suitable manner—as, for instance, by means of straps J, made of metal or other appropriate material, secured to the wagon-body and the side bars. Owing to the flat portions *a b* of the springs A A′ and B, the tendency of the wagon-body to vibrate or sway laterally during the travel of the wheels over uneven ground is lessened. I am enabled to arrange the central portion of the sections A A′ of the springs A A′ closer together, owing to the existence of the flat portion *a*. The flat portion *b* of the spring B also enables the wagon-body to be arranged nearer to the center of this spring. The wagon-body may therefore be arranged quite low.

The springs A A′ cushion the spring B, and the whole combination of springs produces a very easy and steady wagon.

When the sections of the spring A A′ are subjected to weight, they are forced into more intimate contact near the bolts C, and more or less of their surfaces will be forced into contact as the weight or the force of the weight varies. Under great force the sections will have an extended contact, and the space throughout which the sections remain separate will be considerably lessened. Thus the operative length of the sections of the spring

A A′ becomes shortened, and the spring consequently becomes stiffer as the force of the weight becomes greater. This spring can be made short, light, and small transversely, and withal will be stiff. It will be desirably resilient under a light load, and yet stiffer for a heavier load.

In Fig. 4 I have shown the same combination of springs applied to another kind of wagon lacking side bars. The only difference consists in providing the wagon-body K with body-loops L, which are secured by clips or otherwise to the springs.

The springs B are made considerably longer than the springs A A′ M, in order that the springs B may perform to the greater extent the resilient or yielding functions of the combined spring, while the short and stiff springs A A′ M offer the chief resistance to strain. Each, therefore, complements the other in such manner as to render the combined spring very easy, lasting, and durable.

Of course my improvement is not confined in its application to any particular type or kind of vehicle.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with the axle of a wagon or other vehicle, and a body, or side bars supporting a body, of a spring supported by the axle, composed of two sections hinged together and severally having a central flat portion and straight inclined end portions, and another spring considerably longer than the spring first mentioned, having a central flat portion and upwardly-inclined end portions, the flat central portions of one of the sections of the spring first mentioned being secured to the flat central portion of the spring last mentioned, said springs extending transversely to the length of the body of the wagon or other vehicle, substantially as specified.

2. The combination, with an axle in a wagon or other vehicle, and a body, or side bars supporting a body, of a spring supported by the axle and comprising two sections hinged together at their ends, having central flat portions and inclined converging end portions which extend into contact or close proximity near their ends, and another spring considerably longer than the spring first mentioned and secured to the former, substantially as specified, whereby the spring last mentioned will take up the initial force, and as force is increased the portions of the two sections of the spring first mentioned, which are near the ends thereof, will be brought into contact, increasing proportionally with the force applied to the spring in such manner that the spring first mentioned will be shortened and its resistance to strain augmented.

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Witnesses:
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