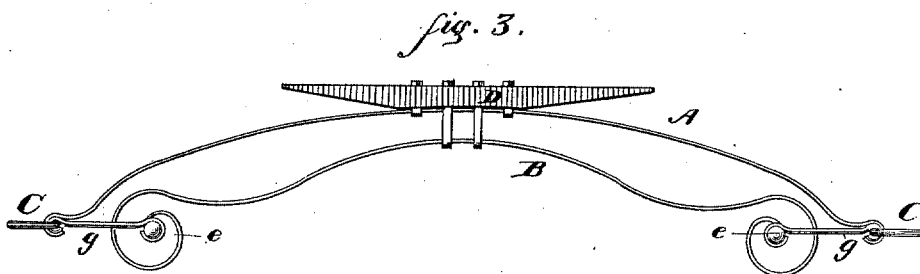
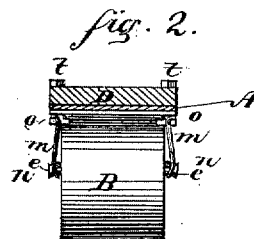
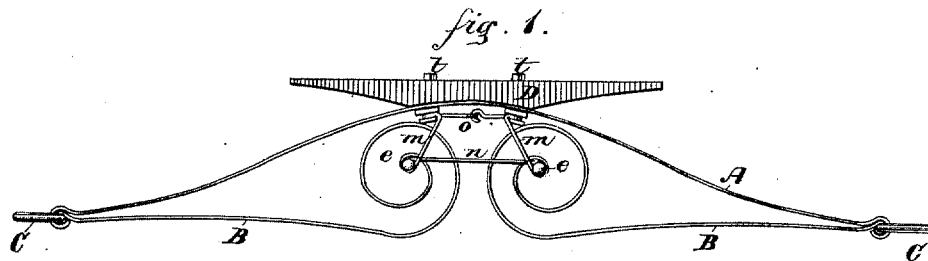


M. R. THURBER.
Vehicle-Spring.

No. 214,064.

Patented April 8, 1879.



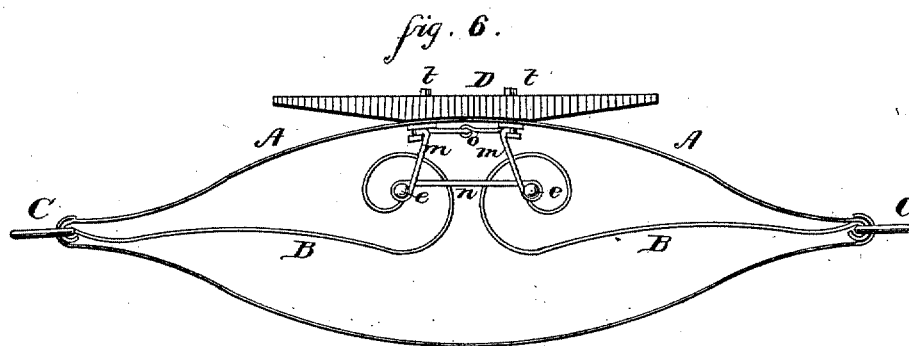
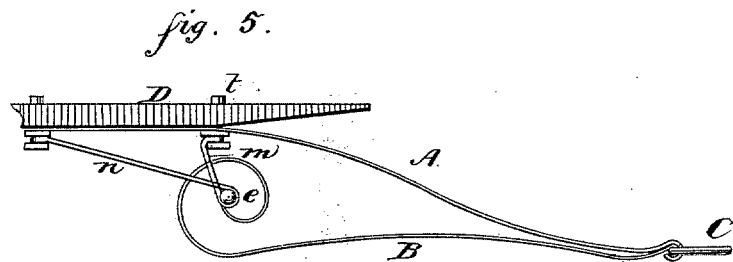
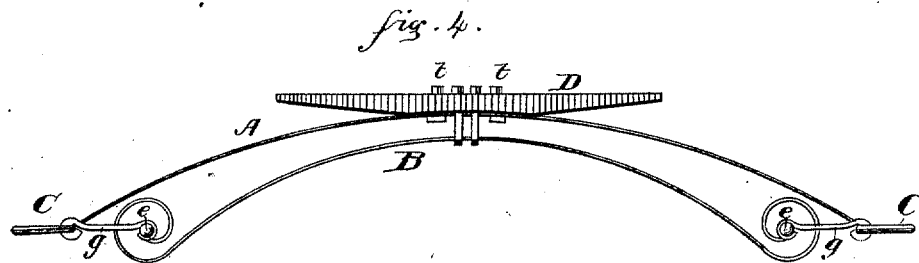
Attest,
W. H. H. Knight,
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Inventor,
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UNITED STATES PATENT OFFICE.

MILTON R. THURBER, OF NICHOLSON, PENNSYLVANIA, ASSIGNOR TO
JAMES MALTER AND ALFRED HARVEY.

IMPROVEMENT IN VEHICLE-SPRINGS.

Specification forming part of Letters Patent No. **214,064**, dated April 8, 1879; application filed
March 4, 1879.

To all whom it may concern:

Be it known that I, MILTON R. THURBER, of Nicholson, in the county of Wyoming and State of Pennsylvania, have invented a certain new and useful Improvement in Vehicle-Springs; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevation of a spring constructed in accordance with my invention. Fig. 2 is a transverse vertical section of the same. Figs. 3, 4, 5, and 6 are views of modifications.

Similar letters of reference in the several figures denote the same parts.

The object of this invention is to improve the construction and operation of vehicle-springs; and the invention consists in the combination of a flat or arched spring or spring-plate with a volute spring or springs, and with connections and braces, substantially as hereinafter set forth.

In the drawings, A represents one member of the combination—to wit, the flat or arched spring or spring-plate—which may be composed of a single plate, or of several plates fastened together in the manner of elliptic springs, and may be either flat or more or less arched, as preferred by the constructor. B B each represent another member of the combination, which is constructed in the form of a flat spring having a volute curve at one end, said spring being arranged under the spring A, preferably in the manner shown in Fig. 1.

The bolster or other portion of the carriage to be supported upon the spring is represented at D. In Fig. 1, the outer ends of the member A and of the members B are connected to a link, C, at each side of the carriage, whereby the spring is supported or preferably suspended at each end. At the inner end of each member B a straight bolt or rod, *e*, extends through the volute, and the end of the volute is closely bent around it. The ends of the rod or bar project at each side of the volute and are provided with a head to prevent their slipping from their support.

Another member of the combination con-

sists in some form of suspending and bracing device, whereby the rods or bolts *e* are suspended and held in position, so as to combine the tension or compression of the volute plate with the tension or compression of the spring A; and the form and construction of this suspending and bracing device will vary according to the form and position of the volute plate and its relation to the plate A. In Fig. 1, such suspending and bracing device consists of a rod, *m*, extending from each end of each rod or bolt *e* up to a bolt, *t*, secured to the bolster, and of two connecting-rods, *n*, extending from one bolt *e* to the other, the outwardly-inclined position of the rods *m* cooperating with the connecting-rods *n* to brace and hold the bolts *e* firmly in position, so that any force applied downward upon or by the middle of the part D will be transmitted simultaneously to and divided between the parts A B, a portion of such force being thrown directly upon the part A, and another portion being transmitted by the rods *m* and the bolts *e* to the inner end of the volute spring. With this construction it will be observed that any force acting downward upon one end of the part D will be mainly resisted by the corresponding end of the spring-plate A and by the volute spring B, which lies under that end. Four bolts, *t*, are preferably employed, one corresponding to each end of the bolts or rods *e*, and the two bolts at each side of the volutes may be connected together, as shown at *o*, or preferably the connection *m n o* at each side of the volutes may consist of a single rod bent around the ends of the bolts *e* and around the bolts *t*, and fastened together between said bolts, as shown in Fig. 1. In Fig. 3, the parts A D are constructed and secured together in the usual manner well known to carriage manufacturers, the same as in Fig. 1; but the volute springs B are applied in a manner the reverse of that shown in Fig. 1, their outer ends being the volutes, as shown. In this case the two springs B may be made of a single plate and connected to the part D in the same manner in which the part A is connected thereto. In such case the volute ends of B are provided with the rods *e*, as before, and are simply suspended by a link or links,

shown at *g*. In Fig. 4 substantially the same construction is shown as in Fig. 3, except that the curve of the volute is reversed.

In narrow vehicles it is sometimes desirable to use two springs, supported at opposite sides of the carriage and extending nearly across under the body of the vehicle, so as to obtain greater leverage and consequently greater elasticity of movement; and my improved spring may readily be adapted to this purpose by constructing it substantially as shown in Fig. 5, or, in other words, bisecting the entire device shown in Fig. 1 and bracing the bolt *e* by means of a rod, *n*, extending diagonally up to the bolster and secured thereto in any competent manner, as shown, or by bisecting the entire devices shown in Fig. 3 or Fig. 4 the same result may be obtained.

I do not limit myself to any particular form of link or other support for the outer ends of the spring, in whatever form it may be constructed, nor to any particular form of the suspending and bracing device at the middle of the spring in the construction shown in Fig. 1, it only being necessary that the inner ends of the scrolls should be so secured, either to the middle of the plate *A* or to the bolster or other object supported by the spring, as that the ends of the scroll shall be held steadily in position and shall receive their due proportion of the weight to be supported or force to be resisted.

It will readily be observed that when the constructions shown in Figs. 3 or 4 are employed, the carriage-axle itself, with the links *g*, answers as the connecting and bracing element which supports and holds the ends of

the volutes to their work and in their proper relation to each other and to the spring *A*.

These springs, in any of their forms, may be applied to other purposes than carriage-springs. Where great force is to be resisted, as in case of railroad-car springs, the plate *A* may consist of an entire elliptic spring, as shown in Fig. 6, instead of being made in the semi-elliptic form shown in Figs. 1, 3, and 4. In such case the scroll plate or plates *B* will be arranged between the upper and lower parts of the elliptic springs, and will co-operate with both of them in resisting the force applied, and will further operate as a cushion between the parts of the elliptic spring in case of their undue compression.

I claim as my invention—

1. The spring herein described, consisting of a flat or arched spring-plate, combined with a volute spring-plate connected to the flat or arched spring-plate in such a manner that the bending of the former compresses the latter.

2. A flat or arched spring-plate, combined with a double-volute spring plate or plates connected to the flat or arched spring-plate in such a manner that the bending of the former compresses the latter, substantially as described.

3. The combination of the entire elliptic spring with the volute spring-plates interposed between its upper and lower members, substantially as described.

MILTON R. THURBER.

Witnesses:

GEO. H. ULMER,
J. A. PRICE.

It is hereby certified that the surname of the assignee in interest in these Letters Patent, as stated in the Letters Patent proper and in the caption of the annexed printed specification, is erroneously given as "Malter." It should be *Matter*.

April 10, 1879.