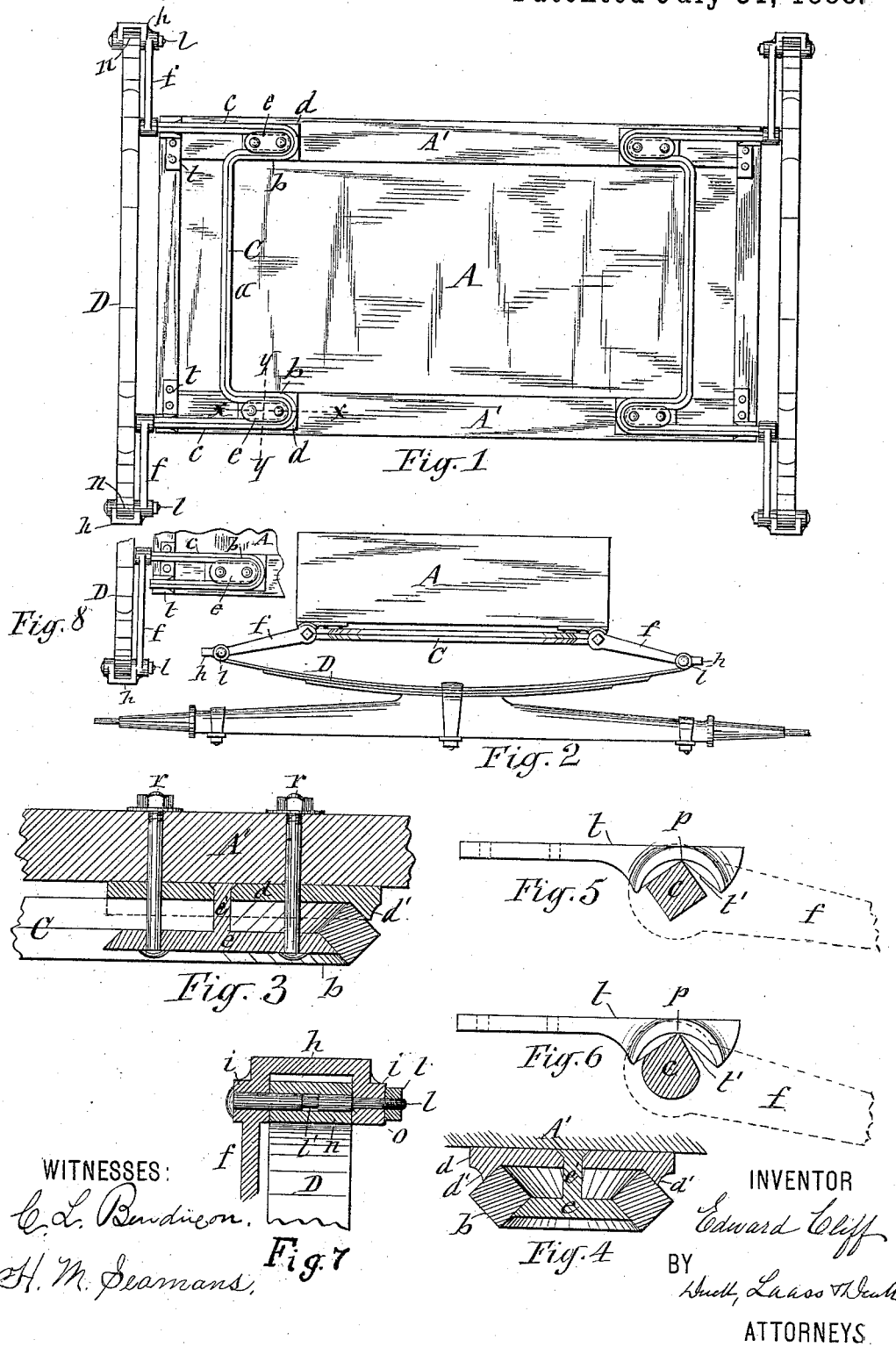


(No Model.)

E. CLIFF.  
SPRING VEHICLE.

No. 387,052.

Patented July 31, 1888.



# UNITED STATES PATENT OFFICE.

EDWARD CLIFF, OF ROCHESTER, NEW YORK.

## SPRING-VEHICLE.

SPECIFICATION forming part of Letters Patent No. 387,052, dated July 31, 1888.

Application filed April 18, 1888. Serial No. 271,035. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD CLIFF, of Rochester, in the county of Monroe, in the State of New York, have invented new and useful Improvements in Spring-Vehicles, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to the class of spring-vehicles in which the body is supported by a torsion-spring secured to the under side of the body and coupled to cross-springs mounted on the running-gear of the vehicle; and the invention consists in a novel construction of the component parts of the spring individually considered, and in a novel combination of said parts, as hereinafter fully described, and specifically set forth in the claims.

In the annexed drawings, Figure 1 is an inverted plan view of a vehicle-spring embodying my improvements. Fig. 2 is an end elevation of the same. Fig. 3 is an enlarged longitudinal section on line *x x*, Fig. 1. Fig. 4 is an enlarged transverse section on line *y y*, Fig. 1. Figs. 5 and 6 are enlarged detail views of the V-shaped bearing of the torsion-spring. Fig. 7 is a sectional view of the coupling of the body-supporting arms to the cross-spring, and Fig. 8 illustrates a modification of the form of the torsion-spring.

Similar letters of reference indicate corresponding parts.

A represents the body of the vehicle, D D the cross-springs mounted, respectively, on the hind axle and head-block of the running-gear.

C denotes the torsion-spring secured to the under side of the body, and *f f* are the coupling-arms connecting the torsion-spring with the cross-spring. This torsion spring is preferably composed of a central bar, *a*, U-shaped loops *b b* at the ends of the bar *a*, and extending at right angles therefrom and in one and the same direction, and the arms *c c* extending from said loops and parallel with each other, all formed of a continuous bar of spring-steel. Said torsion-spring is disposed with its arms *c c* lengthwise of the body, in the usual manner, and is rigidly secured to the under side of the body by a shoe, *d*, interposed between the loop *b* and body A, and provided with a flange, *d'*, fitted closely to the exterior

of the loop, as shown in Figs. 3 and 4 of the drawings. A clip, *e*, is placed astride the loop *b* and rigidly secured to the shoe *d* by a stud-pin, *e'*, projecting from the clip and passing through the shoe and riveted on the latter, and thus the loop is firmly held in the shoe *d*. By means of bolts *r r* passing through the clip and shoe and through the frame A' of the body A, the loop *b* becomes firmly attached to the body. I do not, however, limit myself to the aforesaid construction of the torsion spring C of one continuous bar, inasmuch as I can obtain the same or nearly the same effect by forming said spring in two pieces, each formed with the loop *b*, from which is extended one of the arms *c*, as before described, the loop in this case being prolonged and terminating near one side of the arm *c*, where it is rigidly secured to the body of the vehicle, as shown in Fig. 8 of the drawings. The free end of the arm *c* of the torsion-spring I provide with a V-shaped edge or bearing, *p*, and between this bearing and body A, I interpose a bearing-block, *t*, which is rigidly secured to the frame A' of the body, and is formed with a recessed bearing, *t*, preferably V-shaped, and of a greater angle than the V-shaped edge of the arm *c*. Although the said edge may be formed on a round bar, as shown in Fig. 6 of the drawings, yet to obtain this bearing in a simpler manner I form the torsion-spring C of a square bar and secure the same in its requisite position to bring one of the edges thereof to bear in the seat *t'* by bending the loop *b* in a plane relatively diagonal to the shape of the bar, as shown in the annexed drawings. The arm *c* of the torsion-spring rocking on the V-shaped edge *p* completely obviates friction and liability of squeaking, and, inasmuch as said bearing is eccentric, the rocking of the arm *c* when subjected to strain causes the coupling-arm *f*, which is rigidly attached thereto, to move longitudinally outward, and thus conform to the elongation of the cross spring D when subjected to a load. This harmonious movement of the coupling-arm *f* with the spring D allows me to attach said arm direct to the said spring. This attachment I prefer to make by forming the outer end of the arm *f* with a yoke, *h*, which projects from one side thereof and is formed with eyes *i i*, between

which is inserted the shackle-eye *n*, formed on the end of the spring, as illustrated in Fig. 7 of the drawings. A bolt, *l*, passing through the eyes *i i* and *n*, couples the arm to the spring.

5 The bolt is provided with a nut, *t*, by the tightening of which the two eyes *i i* can be pressed closely against the end of the intervening shackle eye *n*, so as to take up the wear and prevent rattling. In order to guard

10 against excessive pressure between the aforesaid eyes, I form the bolt *l* with a shoulder, *o*, by which it abuts against the inner face of one of the eyes *i*. The central portion of the bolt I provide with a circumferential groove, *l'*,

15 which serves to retain lubricant introduced in the shackle-eye *n*.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

20 1. In combination with the body and its supporting-spring, a rocking bar secured to the body and provided with a V-shaped bearing on the same, and a coupling-arm connecting said rocking bar with the aforesaid spring, as

25 set forth.

2. In combination with the body, the torsion-spring C, formed of a square bar bent into a U shaped loop, *b*, in a plane diagonal relative to the shape of the bar, the metal shoe *d*,

30 interposed between said loop and body and secured to the latter, and the clip *e*, astride said loop and secured to the shoe, substantially as described and shown.

3. In combination with the loop *b* of the

spring C, the shoe *d*, provided with the flange 35 *d'*, and the clip *e*, provided with the stud-pin *e'*, projecting from the clip and passing through the shoe and riveted thereon, substantially as described and shown.

4. In combination with the body A, coupling-arm *f*, and the spring D, formed with the shackle-eye *n*, the coupling-bolt *l*, passing through said eye and through the end of the coupling-arm and formed with the circumferential groove *l'*, substantially as and for the 45 purpose set forth.

5. In combination with the body A, the coupling-arm *f*, formed with the yoke *h* and eyes *i i*, the spring D, formed with the shackle-eye *n* inserted between the eyes *i i*, the coupling-bolt *l*, formed with the shoulder *o*, and the nut 50 *t* on the end of said bolt, substantially as described and shown.

6. In combination with the body A and spring D, the torsion-spring C, provided with 55 the V-shaped bearing *p*, and the arm *f*, rigidly attached to said torsion-spring and coupled to the spring D, substantially as described and shown.

In testimony whereof I have hereunto signed 60 my name in the presence of two witnesses, at Rochester, in the county of Monroe, in the State of New York, this 12th day of April, 1888.

EDWARD CLIFF. [L.S.]

Witnesses:

DE L. CRITTENDEN,

W. D. ARMATAGE.