

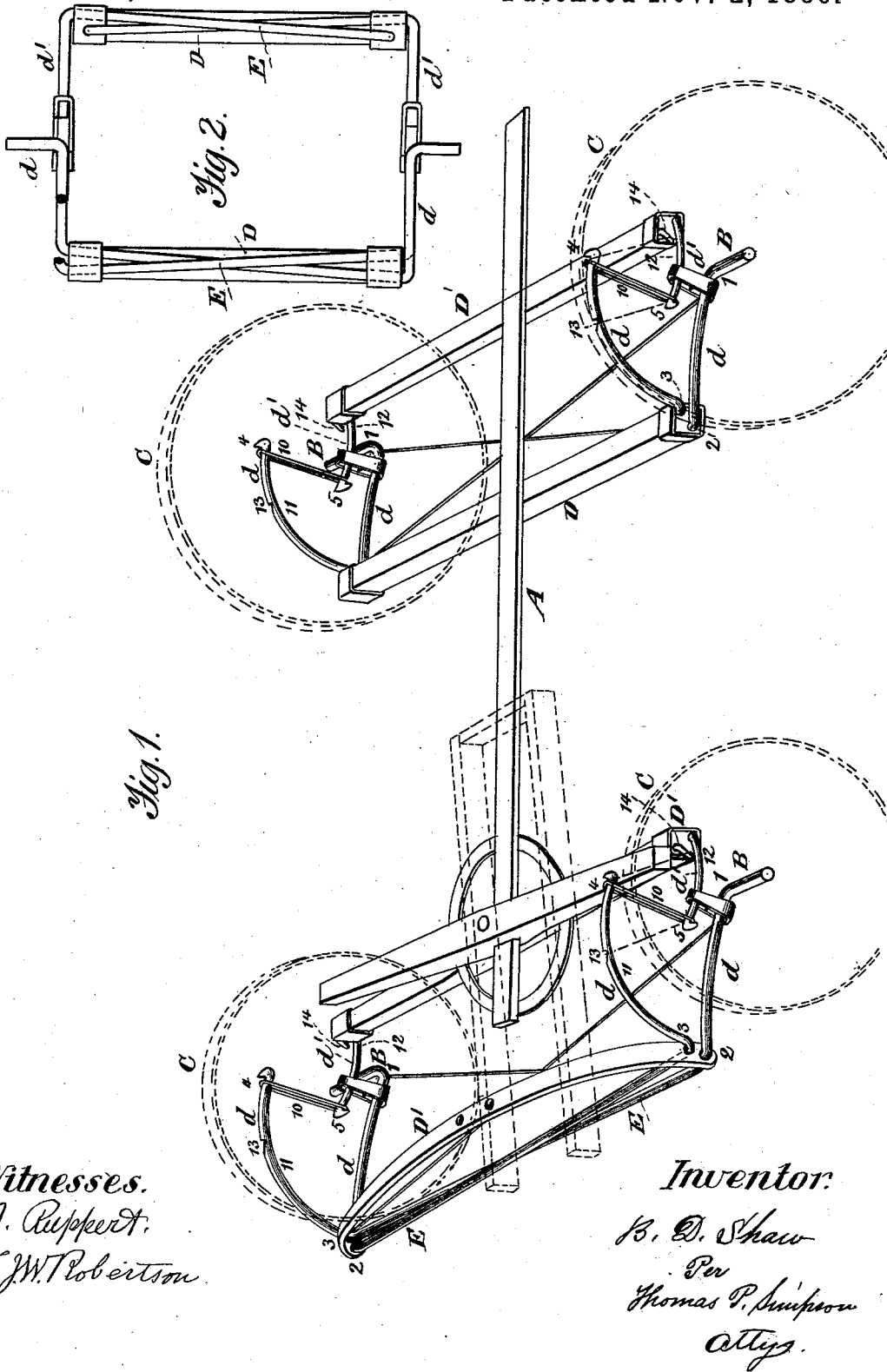
(No Model.)

B. D. SHAW.

TORSION SPRING FOR VEHICLES.

No. 352,071.

Patented Nov. 2, 1886.



Witnesses.
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UNITED STATES PATENT OFFICE.

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TORSION-SPRING FOR VEHICLES.

SPECIFICATION forming part of Letters Patent No. 352,071, dated November 2, 1886.

Application filed June 29, 1886. -Serial No. 206,623. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN DANA SHAW, a citizen of the United States, residing in Waterford township, in the county of Washington and State of Ohio, have invented certain new and useful Improvements in Torsion-Springs for Vehicles; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

The invention will first be described in connection with the drawings, and then pointed out in the claims.

Figure 1 of the drawings is a perspective view showing my torsion-spring applied to a vehicle, and Fig. 2 a detail view of the spring itself.

In the drawings, A represents the coupling-pole or the body of a wagon, both being unnecessary on the same vehicle; B, the axles, and C the wheels.

D D' are a pair of cross-bars rigidly attached to the body or coupling-pole, and E is my improved torsion-spring.

Each spring consists of only one steel rod, *d*, or of two steel rods, *d d'*, of which the first is bent to go through the bore of wheel where no axle is used. With an axle, rod *d* is attached thereto at 1, carried thence to 2 on the front cross-bar, where it is secured to turn, thence along said bar to 3, where it is also secured to turn, thence alongside or along under the bed or body. The second rod, *d'*, is first started at 5, carried across to the cross-bar D', where it is secured to turn, and thence along said bar to a suitable distance and fastened so as not to turn, or to turn only with a little play. The ends of the bars *d d'* are connected by a link, 10, which is movable along the arms 11 and 12 from 13 to 4 or from 5 to 14, in order to regulate the length and stiffness of the spring. The other springs are similar and attached in a corresponding manner, one for each wheel.

The load rests on the cross-bars D D', and the axle as well as cross-bars are all connected by the springs. This gives the desired strength

and allows the wheels to move independently or together, up and down, without jolting the load.

If the right-hand wheel moves up, the end of spring in its bore must also go up, thus twisting the first rod from 2 to 3, while the arm 11 of rod *d* cannot rise if the link runs from 4 to 14. This makes a short stiff spring, while one with a minimum of stiffness is obtained by arranging link 10 on arms 11 12, so as to give the same torsion on each rod. A man soon learns by practice to regulate the torsion with great nicety, so that the rods will twist proportionately to their size and length alike along their whole length, the rod *d* from 2 to 3 and the rod *d'* from 6 to 7.

In order to place the load at different heights from the axles, links of different lengths are employed. The shorter the link the higher will the load be raised from the axle, and the reverse.

The axles are coupled so that they may move independently and accommodate the motion of any wheel at its center, as the end of the spring-arm is made to move back and up in passing over an obstacle.

The advantages of my torsion vehicle-spring are: First, each wheel has its own independent spring; second, the climbing motion of the springs assists materially in surmounting obstacles and producing a more pleasant action; third, the load or bed of vehicle can be let down low for low wheels or raised high for large wheels, so that the latter will run freely under the bed or body; fourth, the springs may be made more or less stiff to suit circumstances; fifth, the fore and hind wheels will have their own springs when they are uncoupled; sixth, my torsion-spring can be used on any vehicle, from a baby-carriage to a lumber-wagon.

I do not have to use the second rod, *d'*, in making the spring unless I desire the lengthening of the spring, as I can get the climbing motion and also the power to place the bed at different heights from the axle by the use of the first rod only, in this case running the link from 4 to bed or back cross-piece at or near 14. Again, the second rod, *d'*, may be placed on same side of axle as the first rod, *d*, or on the opposite side, its arm 12 extending

forward toward the first rod, d , or back away from it, so that the bearing of the load (which is on the cross-bar D' this rod is attached to) may be close to the hind end of the bed, or
 5 farther forward, enabling the body to extend well behind the axle or only about to it, as the nature of the vehicle demands, and for the front axle it enables me to place the wheels or axle back of the king-bolt, so that I can turn
 10 shorter with same width of bed when I use wheels which do not turn under the bed. The arm 12 of this second rod, d' , may or may not be connected to the axle by another arm hinged to it at 5, and extending down to the
 15 axle or to first rod, d , where it enters the bore of the wheel, or where it is attached to the axle. Then by allowing some play or turn to the rod d' where it is fastened to cross-bar D' , or some play of the arm 12 where it is hinged
 20 or secured to axle-arm, and by running link from 4 to cross-bar at or near 14, I will get this kind of a spring: first, the torsion or strength of the first rod, d , only until the arm 12 at point 5 comes to its bearing, where it is
 25 fastened to the axle-arm; then I get the torsion or strength of the second rod, d' , added to that of the first rod; by using two links, one link between the arms 11 and 12, so as to start with an even torsion, the whole length of both
 30 rods, (the longest and easiest spring,) then another link running from 4 to 14, thus giving three powers of spring. To make more plain, suppose I have a link running from 13 to 5 which is taut and another running from 4 to
 35 14 which is slack when I commence loading. As I load the bed the arm 12 at point 5 moves up, letting point 4 move up until link from 4 to 14 is taut. Then as I load heavier point 5

goes down with the bed until it comes to its bearing, where it is connected with the axle- 40 arm. It will be noticed that I get, first, the torsion of both rods, or a spring which is equal to the length of both rods; then when the load tightens the link from 4 to 14 the torsion of the second rod is taken off, and I only get the 45 length of spring in first rod, which is twice as stiff as I started with; then when the load bears down until arm 12 at point 5 comes to its axle-bearing I add the stiffness of this second rod to the first. Hence as I commence 50 loading I get, first, the torsion of the first rod as relieved by the torsion of the second rod; more load gives the torsion of the first rod only, and still more load gives the torsion or strength of the second rod added to that of 55 the first rod—that is, three powers of spring, or from a baby spring (as it were) to a ton spring or more—without changing links or connections.

What I claim as new, and desire to secure 6c by Letters Patent, is—

1. The combination, with the axle, of the cross-bars D D' and the springs E E , all connected together and adapted to operate in the 65 manner described.

2. In a vehicle torsion-spring, the link 10, made movable along the arms 11 and 12 from 13 to 4 and from 5 to 14, to regulate the length and stiffness of the spring, as set forth.

In testimony whereof I affix my signature 70 in presence of two witnesses.

BENJAMIN DANA SHAW.

Witnesses:

WM. H. LEEPER,
 WM. C. SMILEY.