No. 620,718. Patented Mar. 7, 1899.

R. MULHOLLAND.

VEHICLE SPRING.

(Application filed Oct. 29, 1897.)

(No Model.)

Fig.1.

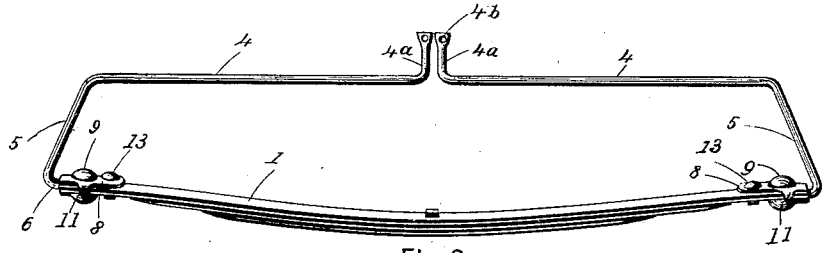


Fig.2.

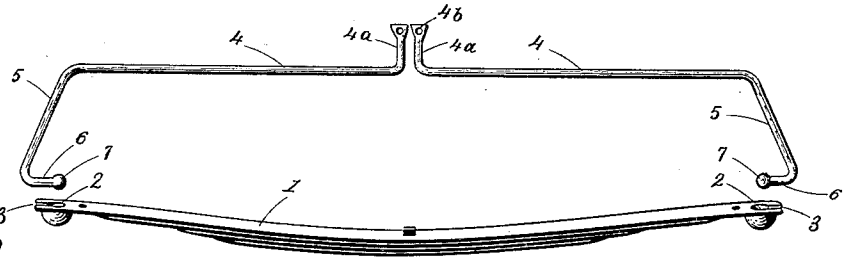


Fig.3.

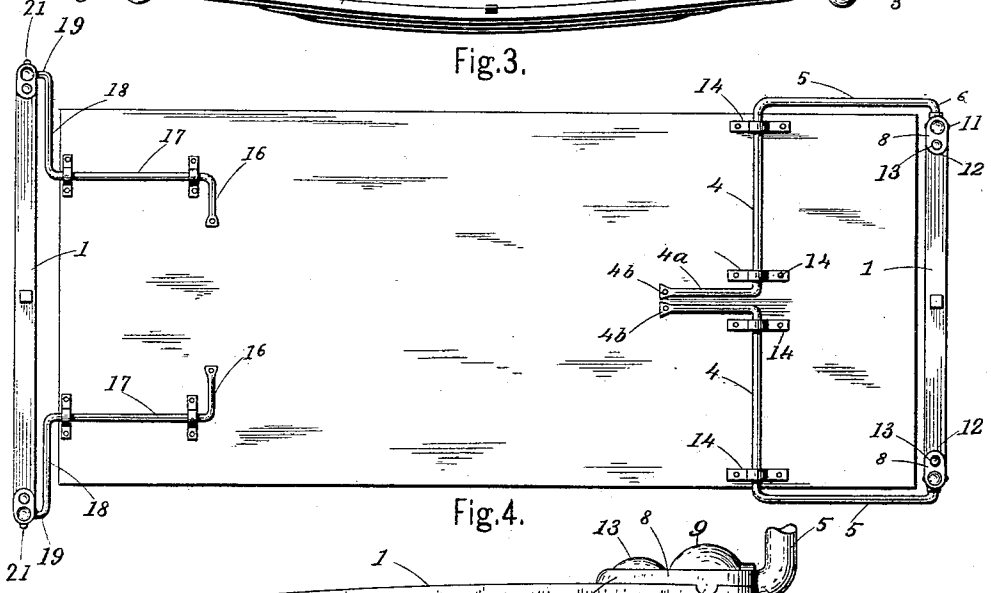


Fig.4.

Fig.5.

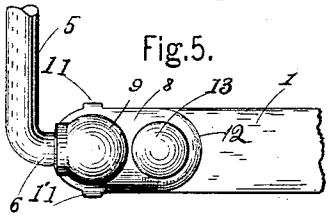


Fig.6.

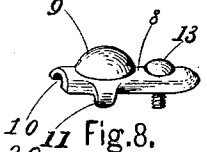


Fig.7.

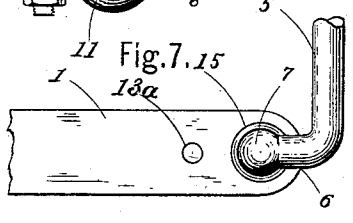
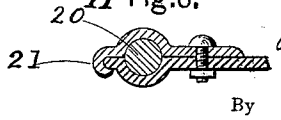


Fig.8.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

RICHARD MULHOLLAND, OF DUNKIRK, NEW YORK.

VEHICLE-SPRING.

SPECIFICATION forming part of Letters Patent No. 620,718, dated March 7, 1899.

Application filed October 29, 1897. Serial No. 656,848. (No model.)

To all whom it may concern:

Be it known that I, RICHARD MULHOLLAND, a citizen of the United States, residing at Dunkirk, in the county of Chautauqua and State of New York, have invented certain new and useful Improvements in Vehicle-Springs, of which the following is a specification.

My invention relates to certain improvements in vehicle-springs; and it has for its object the connecting of torsion-springs with semi-elliptic springs by means of a movable joint and in such a manner as to be easily attached and detached from each other, the torsion-springs being shaped so as to allow their ends to be rotatably supported by the semi-elliptic springs, and thus afford free perpendicular action to the body of the wagon, while preventing all appreciable side sway or movement in other directions, all of which will be fully and clearly hereinafter described and claimed, reference being had to the accompanying drawings, in which—

Figure 1 represents a perspective view of the spring complete. Fig. 2 represents a perspective view showing the semi-elliptic spring detached from the torsion-springs. Fig. 3 represents an inverted plan view of a vehicle-body, showing the preferred form of the improved spring at one end and a modification at the opposite end. Fig. 4 represents a side elevation showing an enlarged portion of the spring and its end connection. Fig. 5 represents an enlarged plan view showing the ends of the semi-elliptic and torsion springs connected. Fig. 6 represents an enlarged perspective view of one of the covers or spring-fasteners, showing the half ball-bearing socket-cup connected with it. Fig. 7 is also a top view of one end portion of the spring, the cover or spring-fastener being omitted to expose the ball and its bushing. Fig. 8 represents an enlarged sectional elevation of a modified construction, cutting centrally through the end of the semi-elliptic spring in a longitudinal direction and transversely through the ball portion of the torsion-spring.

Referring to the drawings in detail, 1 represents a semi-elliptic spring which is provided at each end with a semispherical depression 2, forming half of a ball-socket. A semicircular groove 3 extends outwardly from each depression 2 in the longitudinal direction of the spring to and through the extreme termination of the end of the spring.

The torsion-springs consist of the torsion-arms 4, the short rigid inner arms 4^a, which bend at an angle from the inner extremes of the arms 4, the vibrating arms 5, which extend at substantially right angles from the outer extremes of the arms 4, and the short rotatable arms 6, which extend inwardly and at substantially right angles from the opposite ends of the arms 5 and in a direction approximately parallel to the arms 4. These short arms 6 each terminate in a spherical enlargement or ball 7, which is adapted to seat in one of the depressions 2 in the semi-elliptic springs, the grooves 3 providing seats for the adjacent portions of the short arms 6. Two metallic caps or, as I term them, "spring-fasteners" 8, each of which is provided with a semispherical ball-socket 9 and groove 10, correspond in size to the semispherical depressions 2 and grooves 3 in the semi-elliptic springs. These caps are adapted to be seated over the enlargements or balls to secure them in place. These fasteners 8 are also provided with lips 11, projecting downward from each side thereof and adapted to lap over the sides of the semi-elliptic spring, and an extension portion 12, having a circular opening through which a bolt 13 is passed to secure the fastener to the spring.

In attaching my improvement to a vehicle one of the semi-elliptic springs is attached or secured over the rear axle and another to the head-block at the front of the vehicle in the usual manner. A pair of the torsion-springs is attached to the rear and another pair to the front end of the body of the vehicle by means of the metallic clamps 14, which I term "journal-bearings," each of which fits around the arms 4 and is secured to the vehicle-body by screws or bolts in the well-known way. These clamps or journal-bearings, while firmly securing the torsion-springs to the body of the vehicle, at the same time permit the arms 4 to turn or rotate therein when acted upon under pressure of the outer arms 5. The end of each of the short arms 4^a is preferably

flattened and provided with an opening 4[b] and is firmly secured to the vehicle-body by a bolt passing through said opening. I provide the sockets or depressions with suitable bushings 15 of leather or other material. As the enlargement or ball 7 is seated in the depression 2 and a portion of the short arm 6 is likewise seated in the groove 3 and the cap 8 firmly secured above the ball and short-arm portion, the ball is held firmly between the semispherical depression 2 in the semi-elliptic spring and the semispherical ball-socket 9 and a portion of the short arm firmly between the groove 3 and groove 10, which together form a circular opening which closely encircles the short arm and thereby prevents nearly all side or vibratile movement without interfering with the free rotation or revolution of the arm and ball. The lips 11 prevent all side or transverse motion of the caps with respect to the semi-elliptic spring, and thus materially strengthen the joint. This permits each of the arms 5 of the torsion-springs to move freely in a substantially perpendicular direction in a portion of a circle with its short arm 6 as its center and allows the body of the vehicle free perpendicular motion when in use.

In the modification shown in one end of Fig. 3 the groove in the semi-elliptic springs and the metallic fasteners extend transversely instead of longitudinally, as in the preferred construction, and the torsion-springs consist of the transverse arms 16, which are secured to the bottom of the wagon-body, the arms 17, which extend at substantially right angles from the arms 16 and in the longitudinal direction of the vehicle-body, and the arms 18, which extend at substantially right angles from the termination of the arms 17 and approximately parallel with the transverse arms 16 and terminate in the short arms 19, provided with the enlargements or balls 20.

In the modification the fastener or cap is provided with a hook-lip 21, which extends around and clasps the end of the spring, substantially as shown in Fig. 8.

It will be observed that the ball ends rotate with the same freedom in the sockets and perform the same function in substantially the same manner as in the preferred construction.

I prefer my first construction in most instances, as the torsion-springs are more widely separated from each other and the vehicle is braced more strongly against lateral or side strain.

As different sizes of my preferred construction are required to fit vehicle-bodies of different widths and as the modified construction can be fitted to bodies of any required width, it will be seen that in some instances the modified construction is desirable.

I claim as my invention—

1. In a vehicle-spring, the combination with a semi-elliptic spring formed with a socket at each end, of torsion-springs having vibrating arms provided with short rotating arms bent at substantially right angles thereto and having enlargements adapted to fit said sockets, and socket-caps fitting over the socketed ends of the semi-elliptic spring and the enlargements of the rotating springs, as set forth.

2. In a vehicle-spring, the combination with a semi-elliptic spring formed with a socket at each end, of torsion-springs having vibrating arms provided with short rotating arms bent at substantially right angles thereto and having enlargements adapted to fit said sockets, socket-caps fitting over said spring and enlargements, and lips projecting from said caps over the edge of the semi-elliptic spring, as set forth.

3. In a vehicle-spring the combination with a semi-elliptic spring having depressions at each end and grooves extending longitudinally outward from the said depressions to the ends of the spring; of torsion-springs, having short arms provided with ball portions extending from the vibrating arms, and adapted to be seated in the depressions and grooves, the short arms arranged in a longitudinal direction with the semi-elliptic spring, and the vibrating arms arranged at substantially right angles with the semi-elliptic spring, as shown and described.

4. In a vehicle-spring, the combination with the semi-elliptic spring having sockets at its ends, of torsion-springs having short outer rotating arms extending longitudinally with the semi-elliptic spring and rotatably mounted in the sockets thereof, as set forth.

5. In a vehicle-spring, the combination of the semi-elliptic spring provided at each end with a semispherical depression and a semicircular groove extending from the depression to and through the outer extremity of the end, a fastener also provided with a similar semispherical depression and groove and adapted to form when fitted in place upon the semi-elliptic-spring end, a spherical opening having an entrance-channel, circular in cross-section, of torsion-springs provided with short-arm portions having ball enlargements at their extreme ends said ball enlargements being adapted to fit and seat in the spherical openings, the circular channels closely encircling the short-arm portions and thus permitting only a rotating movement of the short arms within their seats, as set forth.

6. In a vehicle-spring, the combination with the semi-elliptic spring provided at each end with a semispherical depression and a semicircular groove extending from the depression to and through the outer extremity of the end, a fastener also provided with a similar semispherical depression and a semicircular groove and adapted to form when fitted in place upon the semi-elliptic-spring end, a spherical opening having an entrance-chan-

nel circular in cross-section and a lip upon said fastener extending over the edge of the spring, of torsion-springs provided with short-arm portions having ball enlargements at their extreme ends, said ball enlargements being adapted to fit and seat in the spherical openings, the circular channels closely encircling the short-arm portions and thus permitting only a rotating movement of the short arms within their seats, as set forth.

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