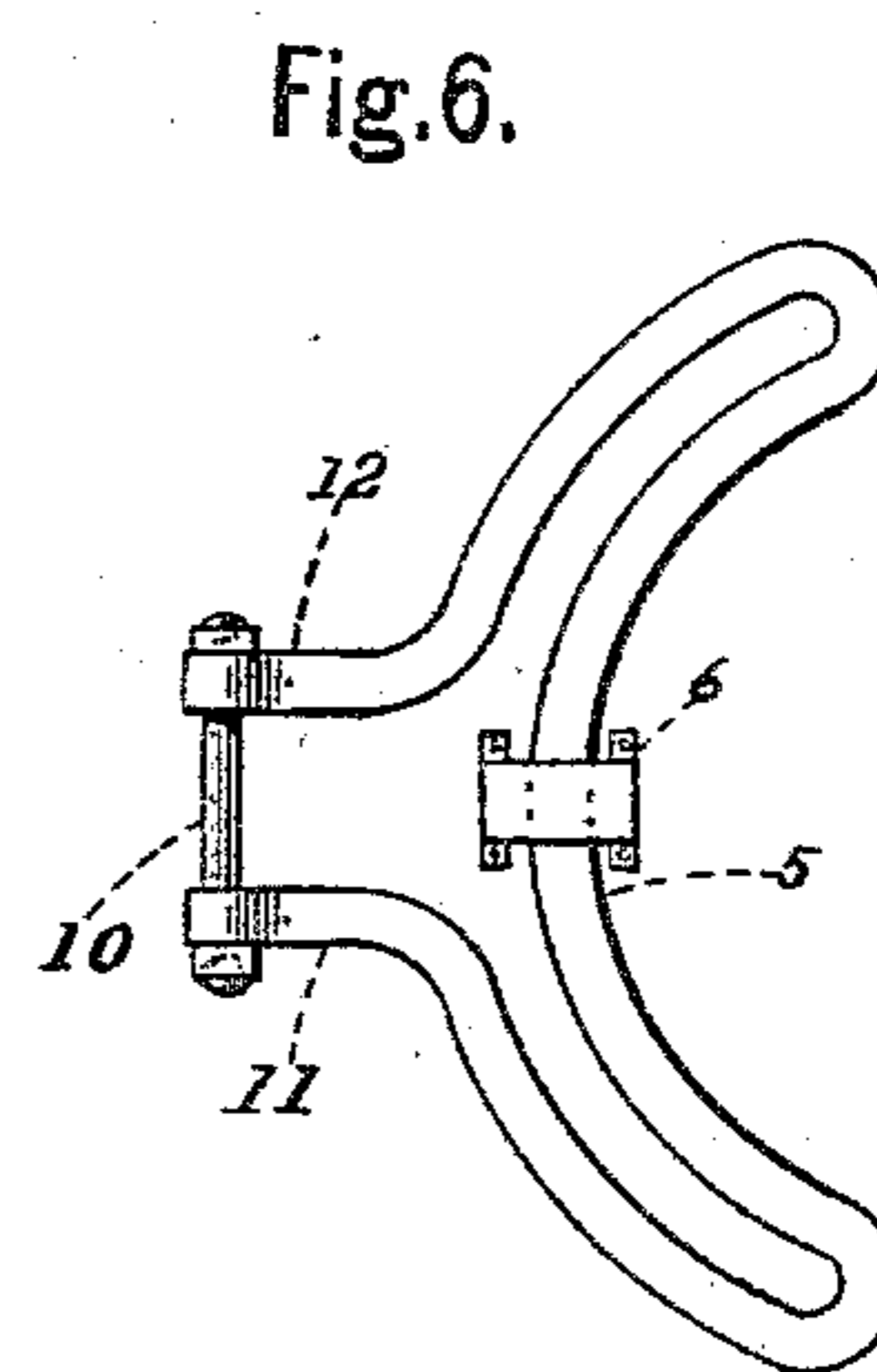
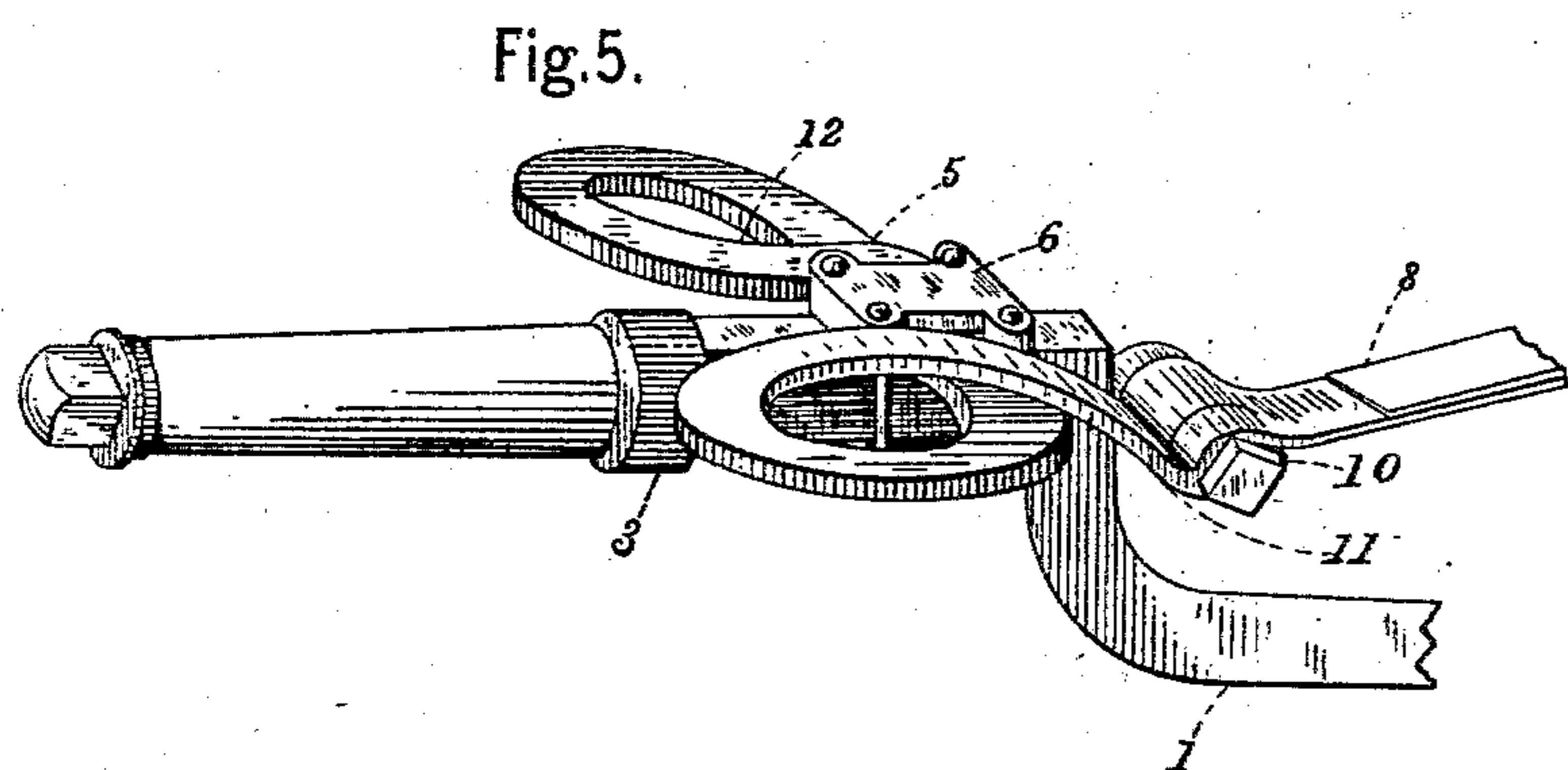
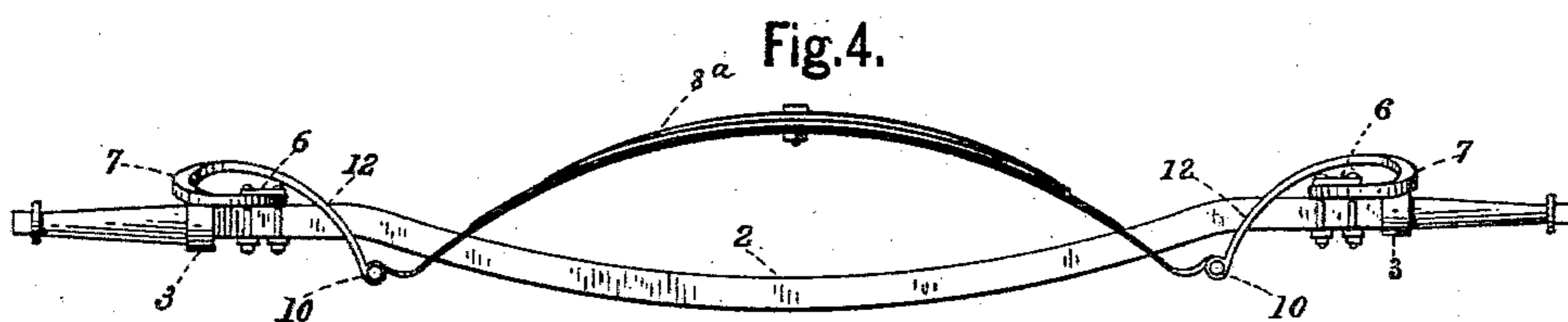
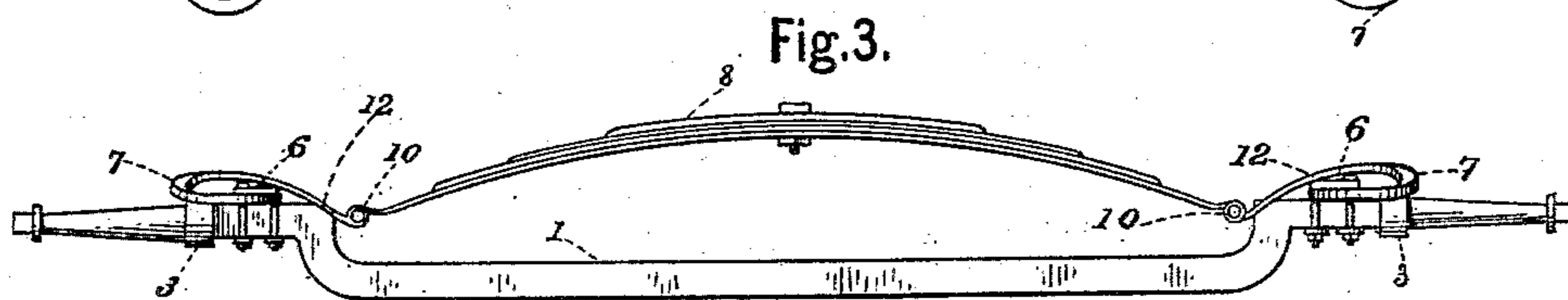
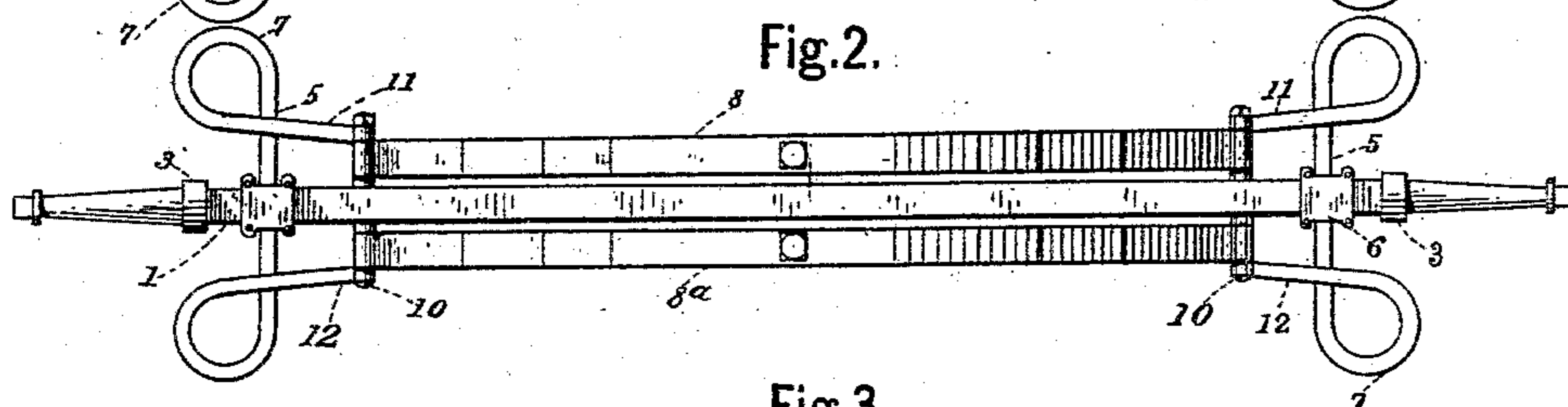
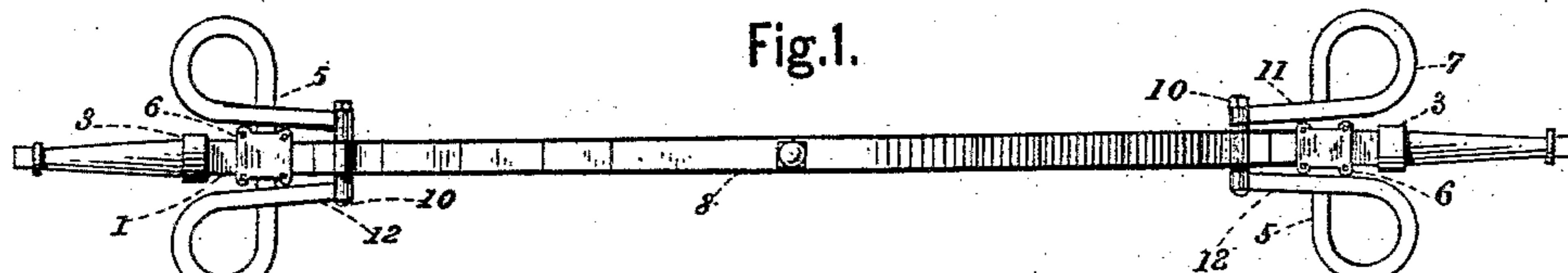


(No Model.)

R. MULHOLLAND.
VEHICLE SPRING.

No. 384,381.

Patented June 12, 1888.



Witnesses.

A. W. Sangster,
H. Johnson

Richard Mulholland, Inventor.

By James Sangster
Attorney.

UNITED STATES PATENT OFFICE.

RICHARD MULHOLLAND, OF DUNKIRK, NEW YORK.

VEHICLE-SPRING.

SPECIFICATION forming part of Letters Patent No. 384,381, dated June 12, 1888.

Application filed December 6, 1887. Serial No. 257,089. (No model.)

To all whom it may concern:

Be it known that I, RICHARD MULHOLLAND, a citizen of the United States, residing in 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 vehicle-springs, and particularly to the improvement of that kind of vehicle known to the trade as a "runabout" or business wagon. These wagons have heretofore usually been constructed with a semi-elliptic spring or springs arranged longitudinally over the axles or parallel with the side or sides of the same in such a manner as to permit the body of the vehicle to be hung low. When links or swinging shackles have not been used to provide for the elongation of the cross-springs, the latter have been made with scroll ends or attached to C-shaped springs rigidly attached to the axle to provide for that purpose. The former is objectionable, as the cross-spring is liable to become fractured or broken around the scrolled ends, and the C-shaped springs are found to be too rigid, are liable to break, and do not provide sufficiently for the elongation of the cross-springs. The swinging links or shackles heretofore commonly used are objectionable, as they give the vehicle a swinging motion, and the links and joints get out of order and rattle. The limited space between the collars of the axles does not permit of making the cross-springs of sufficient length of themselves to produce an easy-riding vehicle.

Therefore the object of my invention is to provide a compound spring which will overcome these objections and otherwise improve the construction of this class of vehicles, and will be fully and clearly hereinafter described and claimed, reference being had to the accompanying drawings, in which—

Figure 1 is a top or plan view of my invention combined with a single semi-elliptic spring. Fig. 2 is a top view of an axle with my improvement attached thereto and connected with two semi-elliptical springs. Fig. 3 is a side elevation of Fig. 1, and Fig. 4 represents a side elevation of Fig. 2. Fig. 5 is an enlarged perspective view of a portion of the device, showing more clearly some of the details

of construction; and Fig. 6 is a modification of the end springs.

My invention consists in certain improvements in vehicle springs, and the combination of a semi-elliptic or other cross spring or springs with springs capable of yielding both vertically and horizontally, and a means for securing them to the axle, whereby the lengthening and shortening of the cross-spring is provided for without the aid of links or shackles and the elastic action of the combined spring is greatly increased.

In the accompanying drawings I have shown a suitable spring combined with a semi-elliptic spring for illustrating my invention.

1 represents an ordinary vehicle-axle, having the inner portion bent or cranked downward, and 2 is an axle slightly different in form.

3 represents the axle-collars.

The end springs, as illustrated, consist of a bar or rod of steel having a square or other equivalent portion, 5, by which they are attached to the axle by means of box-clips 6. They are preferably made in the form of a torsion coil-spring, the portions 5 acting as a torsion-spring, while the coils 7 give it all the elastic properties of a coil-spring. The semi-elliptic springs 8 are made in the usual way and secured to the torsion coil-springs by the pins 10.

I do not wish to confine myself to the particular shape of the torsion coil-springs shown, as they may be made in a variety of forms, acting on the torsion or coil principle.

Fig. 6 shows one of the modified forms which may be used. These springs are preferably curved over the portions 5, as shown, and terminate in the arms 11 12, in the ends of which are the eyes through which pass the bolts or pins 10, which connect the arms 11 12 to the cross spring or springs. The arms 11 12 are bent at right angles to the portions 5, or substantially so, and curved downward, so as to freely permit the ends of the cross-springs to have the usual endwise movement without cramping while in action.

In Figs. 1 and 3 I have shown the torsion coil-springs connected with a single semi-elliptic spring; but, if desirable, two or more semi-elliptic springs, 8 and 8^a, may be connected with the torsion coil-springs, as shown in Figs.

2 and 4, in which case the pins 10 connect them with the torsion coil-spring, the pins 10 being made enough longer to connect the whole, which may be done in any well-known way, and I prefer to bend the axle in this case as shown in Fig. 4.

It will be noticed that in Fig. 3 the pivotal points through which the pins 10 pass are placed above the axle, and in Fig. 4 they are placed below the axle; but the spring will work equally well and accomplish the object of my invention when attached in either position.

I would here observe that the springs may be formed so that the pin 10 (see Fig. 6) may be formed in one piece with the spring, thereby dispensing with a removable bolt, and the ends of the cross-spring may be bent or formed over the part 10 or united thereto in any well-known way, and the ends of the springs may meet, lap, or be welded to each other at some point near or under the clips 6, by which they are rigidly secured to the axle. There are cases in which this construction may be used to some advantage.

I claim as my invention—

1. The combination, with a vehicle-axle and cross-spring, of two flexible springs, each rigidly attached to the axle transversely there- to near the collars, and having two curved arms forming portions of the same projecting outward and then inward approximately parallel with the sides of the axle and yieldingly attached to the cross spring, so as to have both vertical and horizontal action without the aid of links or swinging shackles, substantially as described.

2. In a vehicle-spring, the combination, with the axle and cross-springs, of two flexible springs having their central portions rigidly secured transversely to points near each collar of the axle, and having the two opposite portions of each spring formed into coils which curve outward and terminate in arms projecting substantially parallel with the sides of the axle, and curve upward, downward, and in toward the cross-springs, to which they are pivotally connected, substantially as and for the purposes described.

3. A vehicle-spring having its central portion adapted to be rigidly secured at right angles to an axle, and its two outer portions formed into coils which curve outward, and then terminate in arms extending inward substantially parallel with each other in a direction downward and opposite to the portion by which it is attached to the axle, and having eyes by which it is pivoted to the cross-spring, substantially as described.

4. A vehicle-spring consisting of a central portion for rigid transverse attachment to an axle, which acts as a torsion-spring, and having two outer portions formed into coils which extend outward and act as coil-springs, the inner sides of each coil being provided with an arm extending inward approximately parallel with each other, substantially as and for the purposes described.

RICHARD MULHOLLAND.

Witnesses:

JAMES SANGSTER,
A. W. SANGSTER.