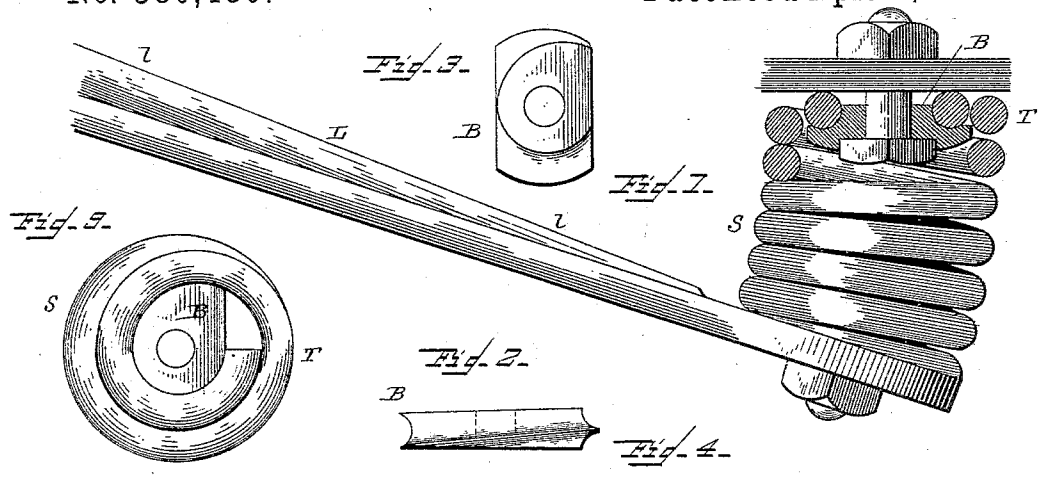
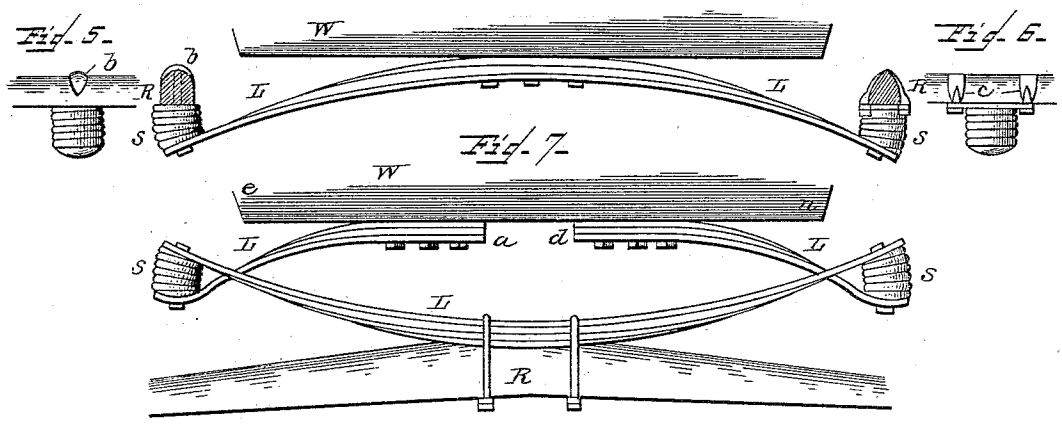
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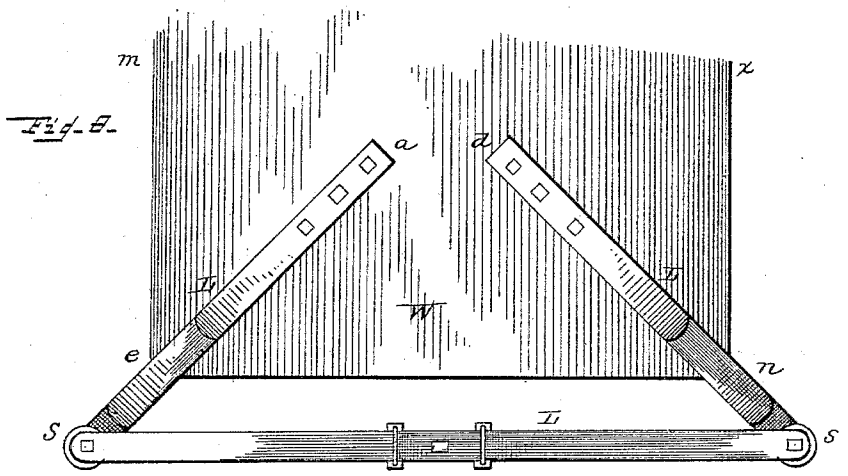
J. D. FURNAS.

SPRING.

No. 380,480. Patented Apr. 3, 1888.







WITNESSES.

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UNITED STATES PATENT OFFICE.

JOHN D. FURNAS, OF WAYNESVILLE, OHIO.

SPRING.

SPECIFICATION forming part of Letters Patent No. 380,480, dated April 3, 1888.

Application filed January 8, 1887. Serial No. 223,839. (No model.)

To all whom it may concern:

Be it known that I, JOHN D. FURNAS, of Waynesville, county of Warren, State of Ohio, have invented certain new and useful Improvements in Springs for Vehicles, of which the following is a full and exact description, reference being had to the accompanying drawings, making part of this specification.

My invention relates to improvements in springs for diminishing concussion; and the objects of my improvements are, first, to combine the great vertical motion of the leaf or plate spring with the universal yielding of extension spiral springs which are rigidly attached at their ends; second, to provide a spring in place of a hinge-joint for leaf-springs, and, third, to provide a desirable method of attaching extension spiral springs. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a side view of the combination; Fig. 2, a side view of the connecting-block for joining the spiral and leaf portions of the spring; Fig. 3, a top view of the connecting-block for securing the end of the spring when turned in, as shown in Fig. 9; Fig. 4, an end view showing the combination applied to a side-bar vehicle; Figs. 5 and 6, side views showing methods of attachment to side bar; Fig. 7, an end view of a vehicle showing combination applied to both ends of the spiral spring; Fig. 8, a top view of Fig. 7; Fig. 9, a view showing the end of the spring coiled in after the manner of a watch-spring.

Similar letters refer to similar parts throughout the several views.

The end of the leaf-spring L is secured rigidly to the end of the extension spiral spring S. The spiral portion S of the combination is on the same side of the leaf portion L as the leaves *l l*. When, therefore, the spiral spring is tensioned, the stress is properly applied to the leaf-spring. A weight borne by one portion of the combination-spring must be borne by the other before reaching the support. When the position of the spring is as in Fig. 1, the weight is applied to the leaf portion L and is communicated to the spiral portion S, which is attached to the support; but when the position of the combination is inverted (see Fig. 7) the weight is attached to S and the support to L.

The block B (see Fig. 2) screws into the spiral spring S, and is then bolted to the leaf-spring, securing said leaf and spiral springs firmly together. At the point T (see Figs. 1 and 9) the wire of the spring ceases to have a pitch while passing around the axis. At the same time it begins to coil inward after the manner of a watch-spring. Upon and within the coil thus formed is fitted the block or washer B, (see Fig. 3,) which is attached to the plate or piece, securely fastening the spring. (See sectional view, upper part of Fig. 1.) The block with bolt attached may have the end of the spring wrapped around it when it is coiled; or said block may be so formed (see Fig. 3) as to be pushed through the aperture in the coil and then be brought into the position shown in Figs. 1 and 9.

The weight W (see Fig. 4) is applied at the bottom of the body of the vehicle to the leaf-spring L, to which it is secured. The leaf-spring L is supported by the extension spiral springs S S, to the lower end of which it is secured. The spiral springs S S are supported by the side bars, R R, to which they are fastened, as by the block B being bolted directly by the bolt *b* (see Fig. 5) to the side bar, R, or by the block B being secured to a plate which is fastened to the bar by the clips *c c*. (See Fig. 6.)

The weight W or body shown by lines *m e n x* (see Figs. 7 and 8) is attached at *a* and *d* to the leaf-springs *a* S and *d* S, whose ends are secured to the lower ends of the spiral springs, whose upper ends are secured to the leaf-spring S L S, which is supported by the running-gear R.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A combination-spring for vehicles, consisting of a leaf and an extensible spiral spring rigidly attached to each other, substantially as set forth.

2. A combination-spring for vehicles, consisting of a leaf-spring and an extensible spiral spring with the block, substantially as described, for securing them together, as set forth.

3. A spring for vehicles formed by the com-

bination of a leaf and an extensible spiral spring, in which the end of the leaf-spring is rigidly attached to the end of the spiral spring, substantially as and for the purpose set forth.

4. The leaf-spring for connecting the extension spiral spring with the weight or support, having a rigid connection with each other, substantially as and for the purpose set forth.

JOHN D. FURNAS.

Witnesses:
A. NEEDLES,
I. E. KEYS.