No. 626,873. Patented June 13, 1899.

M. L. SENDERLING.

SPRING.

(Application filed Feb. 25, 1897.)

(No Model.)

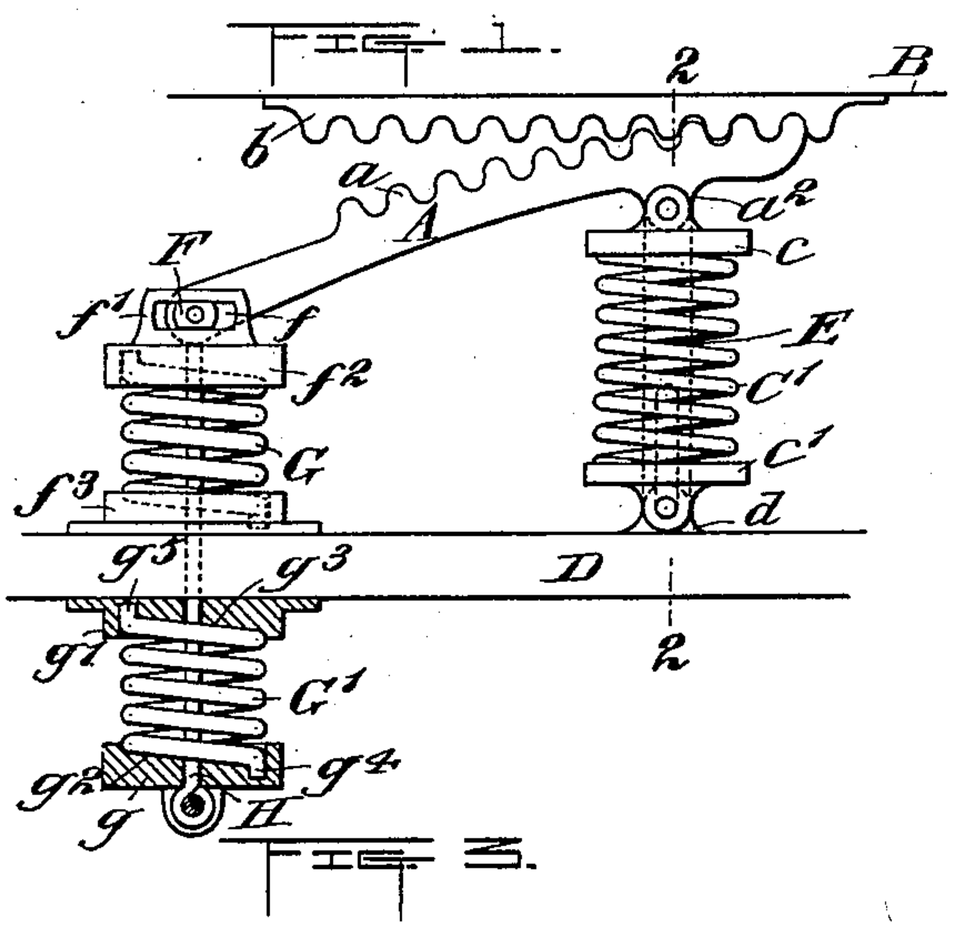


FIG. 3.

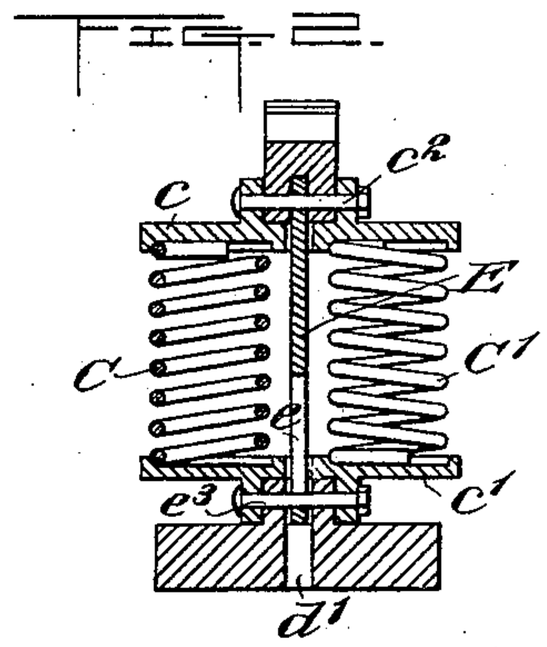
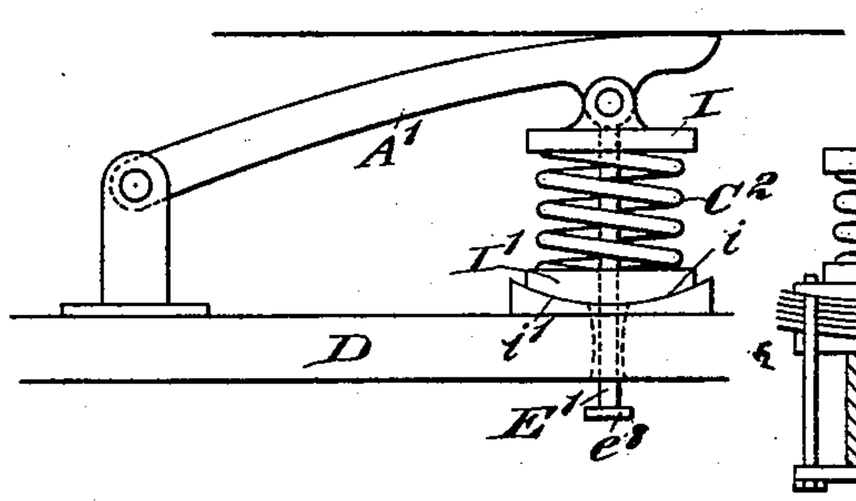


FIG. 4.



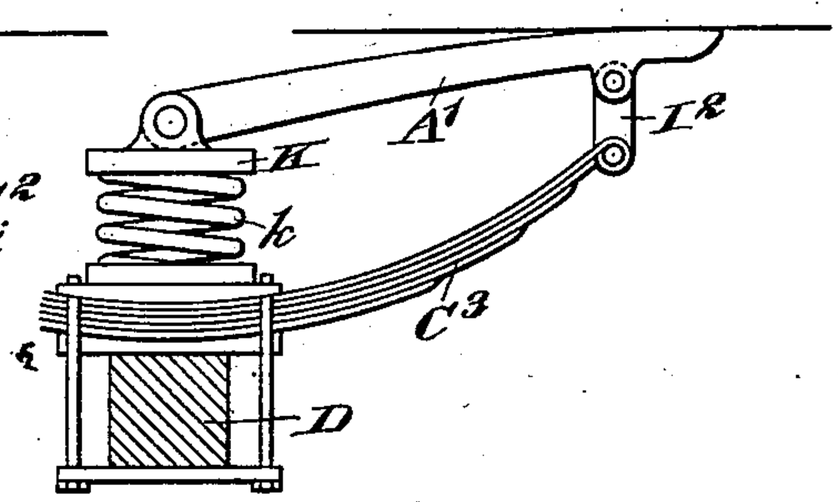


FIG. 5.

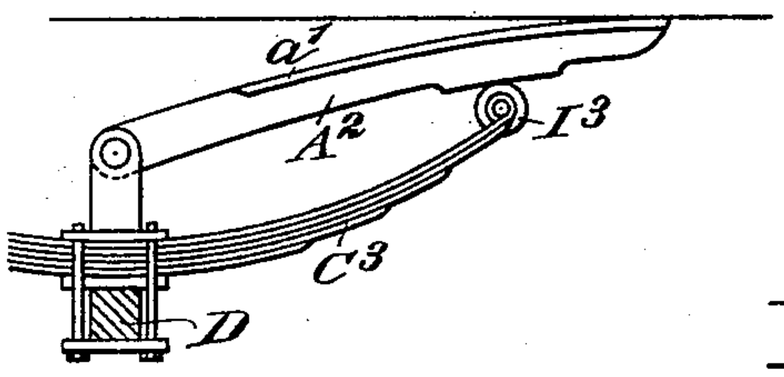


FIG. 6.

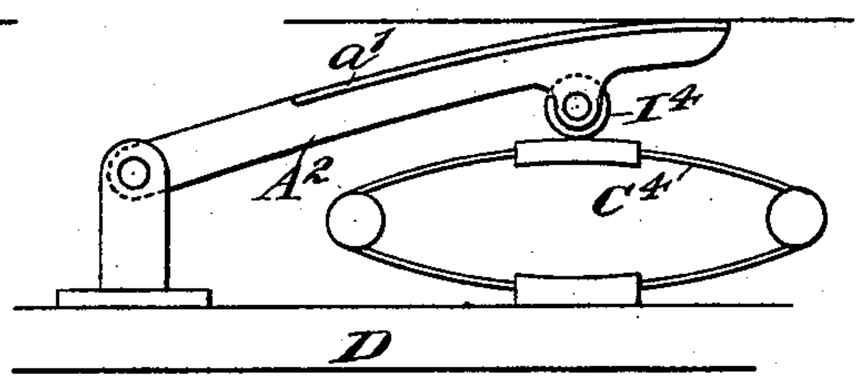
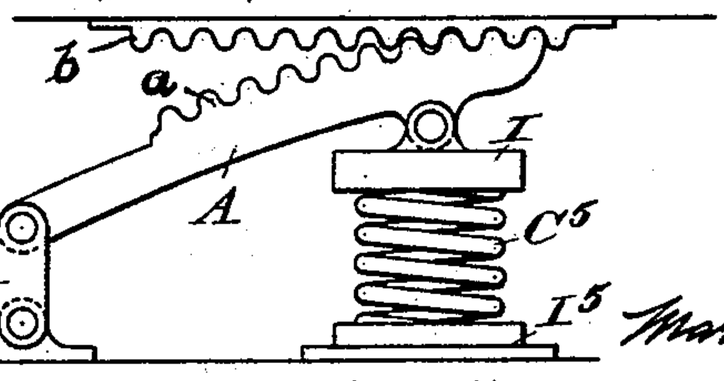


FIG. 7.



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UNITED STATES PATENT OFFICE.

MARTIN L. SENDERLING, OF JERSEY CITY, NEW JERSEY.

SPRING.

SPECIFICATION forming part of Letters Patent No. 626,873, dated June 13, 1899.

Application filed February 25, 1897. Serial No. 624,932. (No model.)

To all whom it may concern:

Be it known that I, MARTIN L. SENDERLING, of Jersey City, in the county of Hudson and State of New Jersey, have invented a new and useful Improvement in Springs, (on certain features of which I have obtained Letters Patent in the following countries, viz: Great Britain, No. 17,202, dated August 4, 1896; France, No. 258,622, dated August 4, 1896; Germany, No. 96,984, dated August 5, 1896; Austria, No. 46/3,348, dated August 30, 1896; Belgium, No. 122,858, dated August 4, 1896, and Canada, No. 54,001, dated November 9, 1896,) of which the following is a specification.

My invention relates to an improvement in springs, and more particularly to a structure by which the spring is given an advantage over the load as the load increases.

In the accompanying drawings, Figure 1 represents in elevation a set of springs for receiving the load upon a lever, the lever being supported yieldingly both at its free and pivotal end and the spring-cushion at the free end of the lever being so mounted as to adjust itself to the varying positions of the lever as the latter is depressed by the load. Fig. 2 is a transverse section through the line 2 2 of Fig. 1, looking toward the right as the drawing is held in reading; and Figs. 3, 4, 5, 6, and 7 represent in elevation various modified forms.

The lever for receiving the load is represented in Figs. 1, 2, and 7 by A, in Figs. 3 and 4 by A′, and in Figs. 5 and 6 by A^2. It varies only in respect to its bearing-face, which in each instance is in the form of a curve; but in the form shown in Figs. 1, 2, and 7 it is provided with a series of teeth *a*, while in the form shown in Figs. 3, 4, 5, and 6 it is smooth.

The form shown in Figs. 5 and 6 differs from that shown in Figs. 3 and 4 by the wearing-shoes *a′*, provided on the bearing-face of the levers. The plate for transmitting the weight of the load to the lever is denoted in each instance by B and may be either a flat platform or a portion of the body of a vehicle, as occasion may require. In the form shown in Figs. 1, 2, and 7 the plate B is provided with a toothed bearing-piece *b*, the teeth of which correspond to and alternate with the teeth *a* upon the bearing-lever. In the remaining forms shown the plate B presents an unbroken surface to the lever.

In all the forms shown the free end of the bearing-lever is supported upon a yielding cushion, while the pivotal end of the lever is in some instances pivoted to a fixed support and in others to a yielding support, as will hereinafter more particularly be described.

Referring to the form shown in Figs. 1 and 2, the free end of the lever is supported upon a pair of helical springs C C′, which are grouped into a gang by means of cap-plates *c c′*, one of which, *c*, is provided with seats for the upper ends of the two helical springs, and the other, *c′*, is provided with seats for the lower ends of the springs. The caps *c c′* are pivotally secured, the one, *c*, to a lug a^2 on the under side of the bearing-lever A by means of a pivotal bolt c^2, which passes through ears on the cap-plate *c* and through the lug a^2 on the bearing-lever A, and the other, *c′*, by means of a pivotal bolt c^3, which passes through ears depending from the cap-plate *c′* and through an upwardly-extending lug *d* on the spring-supporting bar or frame D.

The cap-plate *c* is limited in its upward movement away from the cap-plate *c′* by means of a retaining bar or link E, held at its upper end by the pivotal bolt c^2 and provided at its lower end with an elongated slot *e*, through which the pivotal bolt c^3 extends, the bar or frame D being provided with an opening *d′* for the passage of the link as the spring collapses under the load.

The lever A has a pivotal support in the box F, mounted with a limited sliding movement in slots *f*, formed in the upward-extending lugs *f′* of a top cap f^2. The cap f^2 is supported upon a helical spring G, which is connected to the under side of the cap in such a manner as to utilize the torsion of the spring, the lower end of the spring G being received in a base-plate f^3, fixed to the supporting bar or frame D. Upon the opposite side of the frame D and in axial alinement with the spring G, I locate a helical spring G′, seated at its lower end in a cap-plate *g* and at its upper end in a base-plate *g′*, fixed to the under side of the bar or frame D. The cap-plate *g* is con-

nected with the cap-plate f^2 by means of a link H, which extends axially through the two springs and through the bar or frame D.

The particular manner of fastening the springs G and G′ to their cap and base plates, so as to utilize the torsion of the spring, is clearly represented in connection with the spring G′, its cap-plates being shown in section in order to clearly illustrate the inclined seats g^2 and g^3 on the faces of the plates g and g', respectively, which serve as a support for a portion of each end coil of the spring, the said plates being further provided with sockets g^4 g^5 in the respective plates for the reception of the ends of the spring.

In use when the lever A is depressed by the load the bearing-point of the load upon the lever A will gradually shift from the position shown in Fig. 1 toward the fulcrum of the lever, and after it reaches a point intermediate of the supporting-springs C C and the springs G G′ the load will be distributed upon both sets of springs, the spring at the pivotal end of the lever only receiving a considerable amount of the weight of the load as the bearing-point of the load approaches it. In no instance, however, will the load ever reach a position where it is not yieldingly supported, and the vibrations which are commonly transmitted to the body of a vehicle from its traction-wheels will be almost or quite obviated because of the intermediate yielding cushions.

In the form shown in Figs. 1 and 2, where the bearing-surfaces are toothed, there will be no slipping, as the lever is depressed between the bearing-lever and the part of the load-support which engages with it in the longitudinal direction of the bearing-lever, and in order that the spring at the pivotal support may not be strained from its axial alinement and in order that the spring at the free end of the lever may not be caused to buckle the lever A may be permitted a limited play by the sliding of the bearing-box F, and as a further measure of precaution to be utilized either alone or in conjunction with the play of the lever at its pivotal support the springs C C′ are mounted in the caps c c', so pivoted to their respective supports that the springs C C′ may be swung bodily the short distances required without distorting them.

Any tendency of the supporting-lever A to swing laterally under the impulse of the load bearing thereon will be counteracted both by the gang of springs C C′, which tend to assist each other in preventing such lateral movement of the lever A, and, further, by the torsional pressure which will be immediately imparted to the springs G G′ by such lateral swing of the lever A.

When the bearing-point of the load is in the position shown in Fig. 1, the lever A will fulcrum upon the springs C C′ and its pivotal support will still be yieldingly cushioned by the effect of the spring G′, which will be more or less compressed by the lifting of the pivotal end of the lever A, which end is connected by the link H with the cap g of the spring G′.

In the form shown in Fig. 3 the bearing-lever A is pivoted to a non-yielding support and its free end is supported by a spring C^2. This spring is seated at its upper end in a cap-plate I and pivoted to the lever A′, and the lower end of the spring is seated in the base-plate I′, having a convex lower face i seated in a concave seat i', fixed to the supporting bar or frame D. A retaining link or bolt E′ extends from the pivotal connection of the cap-plate I with the lever A′ axially through the spring C^2 and through the supporting bar or frame D, where it is provided with a retaining-head e^8.

In the form shown in Fig. 4 the spring which supports the free end of the lever A′ is a leaf-spring, (denoted by C^3,) the said leaf-spring being fixed to the support for the pivotal end of the lever A′ and having its free end connected by a link I^2 with the lever A′. In the present form the lever A′ is pivoted to a cap-plate K, supported by a spring k, fixed to the support D.

In the form shown in Fig. 5 the supporting-lever A^2 is pivoted to a fixed support and bears at its free end upon the free end of the leaf-spring C^3, the free end of said leaf-spring C^3 being provided with a bearing-roller I^3, journaled therein.

In the form shown in Fig. 6 the bearing-lever A^2 is pivoted to a fixed support and at its free end is provided with a bearing-roller I^4, which rests upon an elliptical spring C^4.

In the form shown in Fig. 7 the bearing-lever A is supported at its free end by a spring C^5, provided at its upper end with the cap I, pivoted to the lever A, and at its lower end seated in the fixed support I^5. In this instance the lever A is pivoted to a swinging standard L.

In each of the modified forms provision is made for maintaining the spring in such a position as to cause it to work to advantage without liability of buckling or distortion by providing for a relative adaptation of the lever to the spring under the swinging movement of the lever, and this feature, together with the provisions hereinabove particularly called attention to—viz., the yielding support of the pivotal end of the bearing-lever and the guarding against the swaying of the lever—constitute the important features of my present invention.

While I have shown the springs as of coiled and leaf form, I wish it to be understood that I may utilize elastic material of other well-known or approved forms—such, for example, as india-rubber—as occasion may require wherever such form of yielding cushion is adapted to the purpose in hand.

What I claim is—

1. The combination with a pivoted lever and means for applying pressure to the lever at different distances from its pivotal support

as the pressure varies, of a yielding support for the free end of the lever and a rocking connection between the said yielding support and a part to which the yielding support is attached, substantially as set forth.

2. The combination with a pivoted lever and means for applying pressure to the lever at different distances from its pivotal support as the pressure varies, of a gang of springs forming a support for the free end of the lever and a rocking connection between the gang of springs and a part to which the gang of springs is attached, substantially as set forth.

3. The combination with a load-sustaining lever, a support and a pivotal connection between the lever and support, of a spring forming a support for the free end of the lever and rocking connections between the opposite ends of the spring and the parts adjacent thereto, substantially as set forth.

4. The combination with a load-sustaining lever, pivotally secured at one end, a spring forming a support for the free end of the lever, and a part for transmitting the weight of the load to the lever, of a yielding cushion at the pivot end of the spring to permit a yielding movement of the pivoted end of the lever, the load-transmitting part and the load-sustaining lever being constructed to shift the bearing-point of the load on the load-sustaining lever as the load varies, substantially as set forth.

5. The combination with a load-sustaining lever pivotally secured at one end and a spring forming a support for the free end of the lever, of a support for the pivoted end of the lever, and means for permitting the said lever a limited longitudinal movement, substantially as set forth.

6. The combination with a suitable supporting bar or frame, of a spring secured to the said bar or frame, a cap to which the opposite end of the spring is secured, a load-sustaining lever pivoted to said cap and a spring forming a support for the free end of the lever, substantially as set forth.

7. The combination with a suitable supporting bar or frame, of springs secured in alinement upon opposite sides of said bar or frame, caps for receiving the opposite ends of the springs, a rod or bolt connecting said caps, a load-sustaining lever pivoted to one of said caps and a supporting-spring for the free end of said lever, substantially as set forth.

8. The combination with a suitable supporting bar or frame, of a load-sustaining lever pivoted to said bar or frame and provided with a toothed bearing-face, a spring forming a support for the free end of the lever and a toothed bearing-plate for transmitting the weight of the load to the lever, substantially as set forth.

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Witnesses:
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