C. A. LIEB.

SPRING FOR AUTOMOBILES, &c.

APPLICATION FILED DEC. 4, 1908.

922,169. **Patented May 18, 1909.**

Fig: 1.

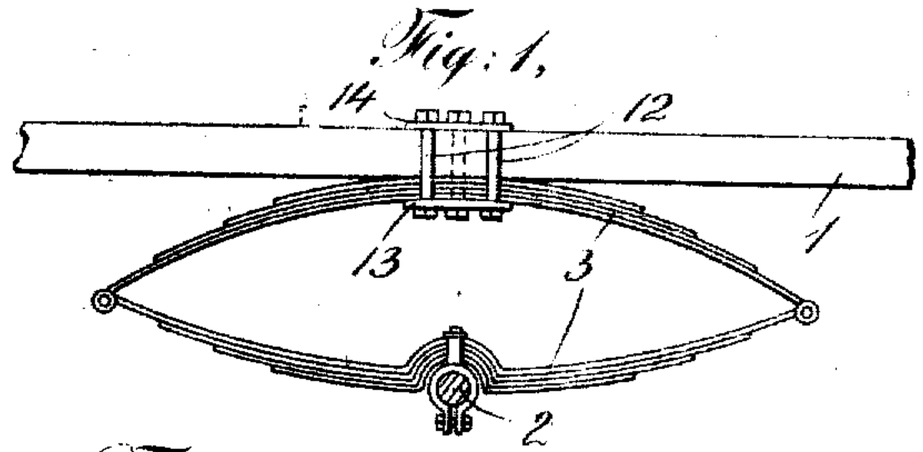


Fig: 2.

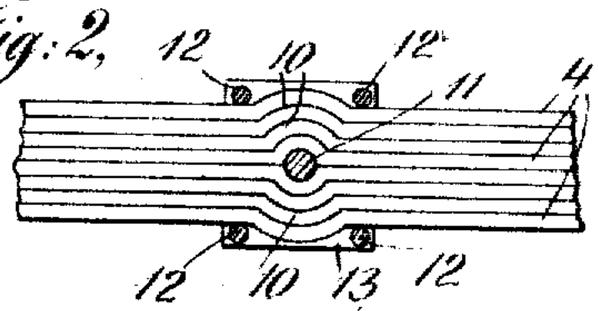


Fig: 3.

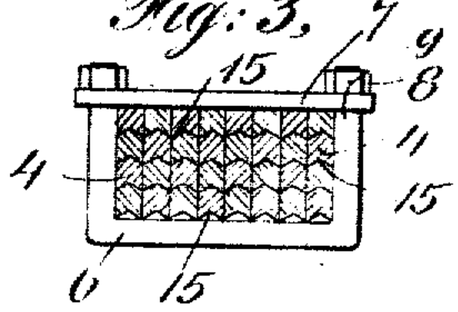


Fig: 4.

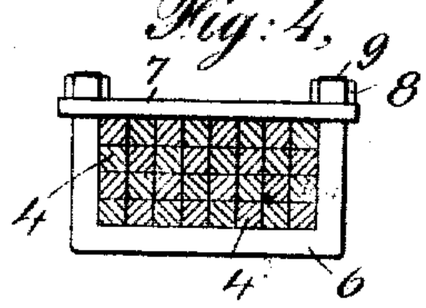
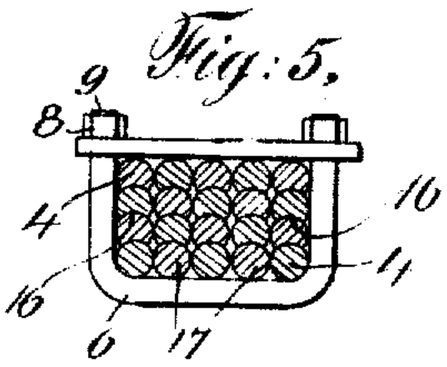


Fig: 5.



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UNITED STATES PATENT OFFICE.

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SPRING FOR AUTOMOBILES, &c.

No. 922,169. Specification of Letters Patent. Patented May 18, 1909.

Application filed December 4, 1908. Serial No. 465,923.

To all whom it may concern:

Be it known that I, CHARLES A. LIEB, a citizen of the United States, and a resident of the borough of Manhattan, city, county, and State of New York, have invented a new and useful Improvement in Springs Adapted More Especially for Use Upon Automobiles, Although Usable in Many other Connections.

It is not generally known why leaf springs, so-called, are employed in the construction of automobiles and vehicles generally to the exclusion of spiral springs. The principal reason is that as the vehicle, when moving rapidly, encounters obstructions in the roadbed, the wheels and the chassis, or body, move differently, the former being light and under the impulse of the springs take immediate cognizance of any irregularity in the road, whereas the body or chassis having greater inertia maintains its former position more continuously until the action of the springs under the influence of the inequalities in the roadbed induces a vibrating or oscillating action between the parts involved which, in the event of a succession of irregularities in the roadbed, generates so much movement as to tend to rupture some parts of the structure and also to unseat the passengers. In order, therefore, to control such continued vibration or oscillation, the leaf springs are preferred to spiral springs, because of the friction between the several leaves of the springs which acts as a brake upon their action, having, to a degree, the same effect as shock absorbers on automobiles, their operation being the same as the friction generated between the leaves of the spring; that is to say, they impede or rather render sluggish the resiliency of the metal which would otherwise be so pronounced as to produce objectionable results, as stated above. For the above reasons leaf springs are the form most universally used. Sometimes full elliptic, sometimes half elliptic and sometimes quarter elliptic and sometimes a combination of these different forms are employed. But in the making of these springs it has been customary to roll bar steel into a flattened or ribbon like form which is then cut into proper lengths for the individual leaves of the springs and then additionally rolled so as to reduce the thickness of the ends. This process of repeatedly rolling the metal changes its atomic structure because the metal which is upon the edges of the leaves has necessarily to move more than the metal constituting the central portions of the leaves. Consequently the atomic structure at the edges is different from that of the central portion and this lack of uniformity engenders crystallization when the springs are in use, resulting ultimately in fracture, bending or other defects.

My invention, therefore, consists in a new and useful method in which to construct the leaves of such springs whereby I preserve the desired frictional contact between the several leaves and indeed increase the same, and at the same time avoid the objections resulting from repeated rolling of the metal.

Under the preferred form of my invention I make the leaves of the springs from a series of bars placed side by side and in order that they may be rigidly held in position so that their ends shall not become displaced, I prefer to deflect them at their central portions, as illustrated, and I also use this same method at one end of the springs when my invention is employed in so-called quarter elliptic springs. I also prefer to so roll the metal that there shall be interlocking surfaces between the several bars whereby the friction is increased in addition to the additional surface thus obtained because of the wedge-shape of the contacting parts of adjacent leaves.

Referring to the drawings, Figure 1 illustrates an elevation, partly in section, of a full elliptic spring embodying the invention; Fig. 2 illustrates a plan view of the central portion of the upper leaf of the upper half of the spring; Figs. 3 and 4 and 5 illustrate modified constructions.

1 represents one of the side bars in an automobile chassis, or the sills in a coach body, or other vehicle, 2 represents the axle, 3, 3, the two halves of a full elliptic spring. Each leaf of the spring, instead of being made of a single solid plate-like part, is composed of a series of bars, 4, 4, 4, 4, shown best in Fig. 2, and in end view in Fig. 4. The bars which constitute each leaf are cut all of the same length and are set side by side, as shown in Figs. 3 and 4 and 5 and are confined in place by the usual clip 6, with compression plate 7 and nuts 8,

with bolts 9. In order that the series of bars which constitute each leaf may not get out of place, I prefer to deflect them somewhat at their central part, as shown best in Fig. 2 at 10, and they are additionally held in place by a central bolt 11 and additional bolts 12 which pass through and engage with clamping plates 13 and 14; and also in order to retain the extremities of the bars in proper relation to each other, I prefer that the bars of adjoining leaves should be shaped, as shown in Figs. 3 and 5; that is to say, the surfaces are shown in Fig. 3 in the form of a V-shaped groove 15 and in Fig. 5 they are shown in the form of a semi-circular recess 16, in which the circular surface of the adjoining bars nests or fits. The ends of the bars composing the leaves may be either of full size or taper as desired and in the case of the wedge-shaped interlocking surfaces, I prefer that the ends of the bars be tapered laterally to a point so as to get more smooth flexure. Instead of deflecting the bars, or employing any of the means shown for holding them in position, they may be soldered or brazed together at the center of elliptic or half elliptic springs and at the fixed end of quarter elliptic springs. This construction will be preferred where it is desired to save space.

It will be noted that in this new form of spring I secure not only the uniform atomic structure in the metal referred to above, but retain also, indeed materially increase, the frictional or braking action between the several leaves constituting the spring; also I secure two important additional advantages, that is to say: upon hillsides and where the wheel on one side of the vehicle encounters a rock or a gutter or other obstruction which the wheel on the opposite side does not encounter, then there is in addition to the usual compressing strains a transverse torsional or racking strain which tends to twist the springs, and it is these racking strains more than the uniformly compressing strains which fracture the leaves of springs as now used; and it will be noted that owing to my construction the torsional strain exerted upon the leaves of the spring when transverse or racking strains occur are relieved, because the individual bars constituting the leaves of my springs which are subjected to such strains can yield readily without undue strain. Consequently torsional or twisting strains upon the leaves do no injury and in addition there is the frictional contact between the lateral sides of the bars constituting each leaf as well as the frictional contact between their upper and lower surfaces.

In addition to the advantages above referred to, my invention possesses an advantage of marked importance from a manufacturing standpoint, that is to say, I can make springs of any width, in other words, any power desired, from the same size rods or bars by simply increasing or decreasing the number of the bars, in other words the width of the leaves, thus avoiding the necessity for carrying in stock a large amount of material as heretofore necessary.

In the drawings hereof I have not attempted to illustrate the specific form or construction of the parts referred to, because they are of endless variety, depending upon the character and special construction of the said parts in different vehicles. I have merely indicated the parts and their coactive operation and location sufficiently to enable those who are familiar with such matters to fully understand the invention and its method of operation; and of course it will be understood that the ends of the longer or inner leaves are to be rolled over to form the usual eye to engage with the usual cross-bolt.

Obviously modifications in the construction and to a certain extent in the arrangement of the parts may be made without departing from the essentials of the invention. I therefore do not limit myself to that which I have specifically described and illustrated.

I claim:

1. A vehicle spring composed of a series of superposed leaves, each leaf being formed of a series of bars placed side by side, for the purpose set forth.

2. A vehicle spring composed of a series of superposed leaves, each leaf being formed of a series of bars placed side by side, the engaging surfaces of the bars of adjoining leaves being so formed as to interlock with each other, for the purpose set forth.

3. A vehicle spring composed of a series of superposed leaves, each leaf being formed of a series of bars placed side by side, the central portions of the bars being deflected and means whereby the deflection of the bars will tend to hold them in place, for the purpose set forth.

4. A vehicle spring composed of a series of superposed leaves, each leaf being formed of a series of bars placed side by side, the engaging surface of the bars of adjoining leaves being so formed as to interlock with each other, the central portions of the bars being deflected and means whereby the deflection of the bars will tend to hold them in place, for the purpose set forth.

5. A leaf for a vehicle spring composed of a series of bars placed in frictional contact with each other laterally, portions of the bars being deflected whereby they may be held to one another, for the purpose set forth.

6. A vehicle spring composed of a series of superposed leaves, each leaf being formed of a series of bars placed in frictional contact with each other side by side, the engaging surfaces of the bars of adjacent leaves

being so formed as to interlock with each other, whereby the friction between adjoining leaves is increased.

7. A vehicle spring composed of a series of superposed leaves, each leaf being formed of a series of bars placed side by side, the bars being deflected at some part of their length and means to engage with the said deflection whereby the several bars may be held in proper relative position.

8. A vehicle spring composed of superposed leaves, each consisting of a plurality of separately movable bars.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES A. LIEB.

Witnesses:

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PHILLIPS ABBOTT.