(No Model.)

N. L. HOLMES.

BOLSTER SPRING.

No. 448,342. Patented Mar. 17, 1891.

Fig. 1.

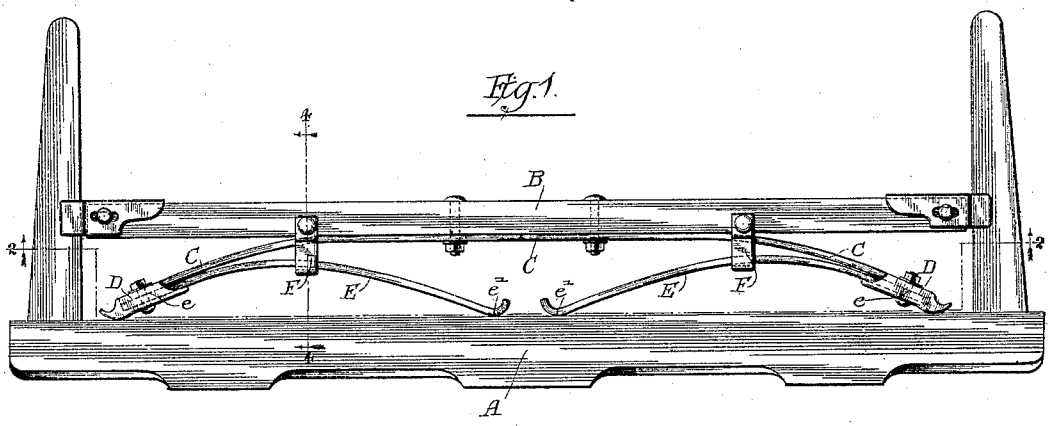


Fig. 2.

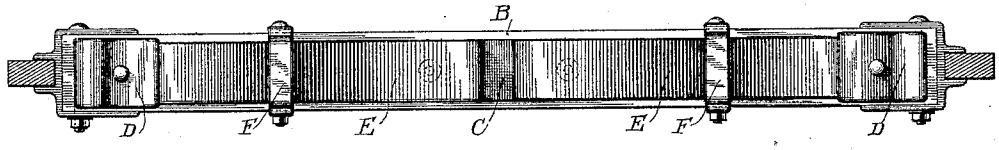


Fig. 3.

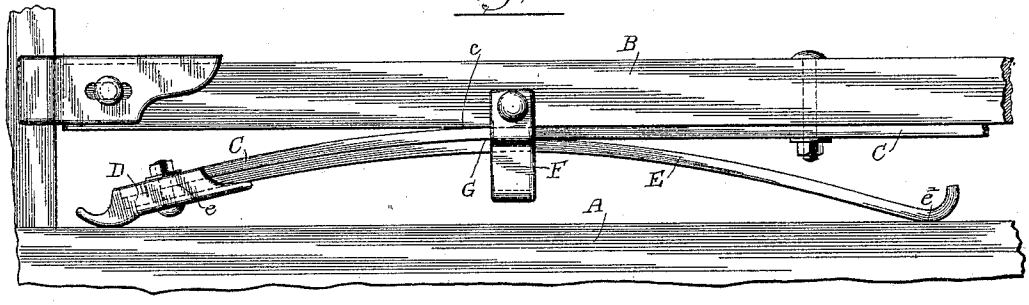
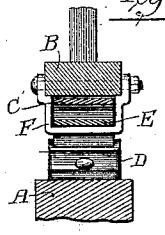


Fig. 4.



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UNITED STATES PATENT OFFICE.

NATHAN L. HOLMES, OF RACINE, WISCONSIN.

BOLSTER-SPRING.

SPECIFICATION forming part of Letters Patent No. 448,342, dated March 17, 1891.

Application filed August 12, 1890. Serial No. 361,777. (No model.)

To all whom it may concern:

Be it known that I, NATHAN L. HOLMES, a resident of Racine, in the county of Racine and State of Wisconsin, have invented certain new and useful Improvements in Bolster-Springs; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in the construction of springs of that class which are interposed between the bolster of wagons and the spring bar or support located over the same upon which the wagon-box rests. Heretofore springs of this class have been made chiefly of the ordinary semi-elliptic form, being secured centrally to the spring-bar and having bearings at or near its ends upon the bolster. This form of spring is objectionable, from the fact that in order to make the spring strong enough to sustain a heavy load it must be made so heavy as to destroy in a great measure its elasticity under light loads. Another form of device of this nature consists of a continuous semi-elliptical spring secured centrally to the spring-bar and bearing against the bolster at or near its ends and having re-enforcing spiral springs interposed between the ends of the spring-bar and the extremities of the spring. With this form of spring also elasticity has been sacrificed in order to obtain the necessary strength, and the spiral re-enforcing springs are only brought into operation when the spring-bar has been depressed to a considerable extent. The liability to sudden shocks, due to the sudden variations in the resistance of the spring in a construction of this kind, is obvious. It is the purpose of this invention to overcome all these objections to the forms of such springs as heretofore made.

The various features of my invention will be hereinafter more fully set forth, and pointed out in the appended claims.

Referring to the accompanying drawings, Figure 1 is a front elevation of my improved spring as applied to a wagon-bolster. Fig. 2 is an inverted plan view of the spring-bar with the spring attached. Fig. 3 is an enlarged view of a portion of the spring, showing the positions assumed by the parts when subjected to a heavy load. Fig. 4 is a cross-section of the bolster, spring-bar, and spring on line 4 4 of Fig. 1.

As shown in said drawings, A indicates the wagon-bolster of any ordinary form.

B indicates a horizontal vertically-movable bar upon which the wagon-box or the load rests, and which is herein termed the "spring-bar."

C indicates a continuous curved leaf or plate spring connected with the spring-bar at or near its center and having its ends curved downwardly away from the said bar.

E E indicate separate curved plate or leaf springs arranged with their curved sides upwardly and secured each at one of its ends to one extremity of the mainspring C, as shown at *e e*, and having each a bearing at its other end upon the bolster, as shown at *e' e'*, said springs being disconnected from each other, so that each may move independently of the other. Stirrups F F, attached to the spring-bar, are arranged to embrace the springs C and E E, and serve to retain said springs E E in their proper positions, preventing any liability of displacement of said springs by lateral strain when in use on the vehicle or from rough handling at other times.

As a further improvement, shoes D D are provided at the points of connection between the spring C and the auxiliary springs E E where they bear upon the bolster to take the wear occasioned by the constant rubbing together of the parts, although this arrangement is of course not essential as far as the operation of the main parts described is concerned, inasmuch as the extremities of said springs may be secured together and adapted to bear directly upon the bolster.

The several advantages gained by the construction of the spring above described may be better understood from the following: As the load is increased, the points of contact of the springs C with the springs E E will approach the centers of said springs. Similarly the limits of the surfaces of the spring C and the bar B in contact with each other will be brought nearer the ends of said spring C. It follows that the yielding portions of the spring C—to wit, those portions of said spring between

said bearing or contact points—are shortened, and the portions of the springs E E between the points of contact of the spring C thereon and their other extremities are also shortened as the load is increased. The shortening of the yielding or flexible portions of the springs obviously makes them more rigid, and it follows that the increase in the load occasions a corresponding increase in the rigidity and consequent sustaining power of the springs. The manner in which the elastic or effective portions of the springs are decreased in length is clearly seen in Fig. 3, which shows the spring when subjected to a heavy load. It will be seen by reference to said Fig. 3 that as the load is applied and the spring-bar B is depressed the spring C will be partially straightened or flattened, so as to bring a greater part of its length into contact with the spring-bar and will support said bar for a greater portion of its length. To give greater strength to the spring-bar and to enable the same to be made lighter and thinner than would otherwise be necessary, the spring C is shown as arranged to bear against the spring-bar for a portion of the distance between its central point of attachment and its ends and as bent downward at its end portions only. It is obvious, furthermore, that when the load is light no great strain comes upon the spring-bar, but with greater loads the danger of breakage to said bar is increased, and there is need of additional support to said spring-bar, which is afforded by the spring C when made as shown. I prefer to form the springs E E with a greater degree of curvature from their outer extremities to their centers than for the remaining portion of their length, it being found in practice that good results are obtained when the springs are so shaped that when the load is so great as to bring the contact-points near the centers G the curvature of both ends of said springs will be substantially the same. By curving the springs in the manner described the angle between the springs C and E E is somewhat large when the springs are free, so that a considerable load is necessary before the springs will be brought or closed together. It follows that a very even and gradual increase in strength or tension of the springs is obtained as the strain on the springs is increased, it being evident that as the spring C becomes straightened the points of contact between said spring C and springs E E gradually approach the centers of said springs E E until the pressure of the spring-bar comes directly upon said springs E E. The effect of such action of spring C is to partially straighten the outer ends of said springs E, and the increase in the resistance of the springs will have been so gradual as to prevent any shock when the spring-bar comes to a bearing against the said springs E E, whereas if the angle of divergence of the springs E E from spring C were such as to permit the springs to come together with a relatively light load the strain would come suddenly upon said springs E E in the jolting of the wagon and shocks or jars would be experienced, while the liability of breakage would be increased. The stirrups F F serve as guards to prevent the springs from being completely flattened out by the application of a load too great for the sustaining power of the spring or by an unusual shock, as said stirrups will come into contact with the bolster and relieve the springs from the excessive strain before the spring-bar is depressed sufficiently to entirely straighten out said springs.

By the arrangement shown it will be seen that there are always four points of support for the load, and when by an excessive load the stirrups F F are brought into engagement with the bolster there are six points of support, thus uniformly distributing the strain of the load throughout the entire spring-bar. It will also be seen that by this arrangement the necessity of heavy springs is altogether done away with, and while the spring is so arranged as to automatically adjust itself to the load, still the elasticity of the spring under light loads is very great, inasmuch as the load is carried by the springs C and E E, which at such time act without supporting each other or in the manner of a very long and light spring.

Another advantage possessed by my improved form of springs is that in case the bolster should not be horizontal the bed of the wagon may be readily leveled by introducing between either end of either spring E and the bolster a block or wedge of sufficient thickness to raise the side of the wagon-bed to the required height. This adjustment may be readily effected without in any way disarranging the spring or hindering its proper operation. It is obvious that springs of this form are very cheap to manufacture, owing to their simplicity of construction and to the fact that they are made of plain flat plates not tapered, and also that they may be secured to the spring-bar and to each other in the simplest possible manner. Any form of fastening may of course be employed to secure the springs C and E E together; but in the form shown the shoes D D are made with side flanges, thereby forming sockets or recesses, into which the ends of said springs are introduced and held by a single bolt.

Having described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The combination, with a spring-bar, of a bolster-spring consisting of a curved leaf or plate spring adapted to rest at its central part against the spring-bar, and curved auxiliary leaf or plate springs, each of which is attached to one end of the main spring and has bearings at both of its ends upon the bolster, substantially as described.

2. The combination, with a spring-bar, of a

bolster-spring consisting of a curved leaf or plate spring adapted to rest at its central part against the spring-bar, and curved auxiliary plate or leaf springs, each of which is attached at one of its ends to one end of the main spring and has bearings at both of its ends upon the bolster, substantially as described.

3. The herein-described vehicle-spring, consisting of a continuous curved plate or leaf spring secured at its central part to the spring-bar and at each of its extremities with the outer end of an auxiliary curved plate or leaf spring, said auxiliary spring having a bearing at each of its ends upon the bolster, substantially as described.

4. The combination, with a spring-bar, of a bolster-spring consisting of a curved plate or leaf spring adapted to rest at its central part against the spring-bar and having its extremities secured within bearing-shoes, and auxiliary curved plate or leaf springs, each having one of its ends secured within one of the said shoes and the other end adapted to bear upon the bolster, substantially as described.

5. The combination, with a spring-bar, of a bolster-spring consisting of a continuous curved plate-spring secured at its central part to the spring-bar and having its extremities secured within bearing-shoes, and two auxiliary curved plate-springs, each having its outer end secured within one of said bearing-shoes and its inner end adapted to bear upon the bolster, substantially as described.

6. The combination, with a spring-bar, of a curved plate or leaf spring adapted to rest at its central part against said spring-bar and at each of its extremities secured to one end of an auxiliary curved plate or leaf spring, said auxiliary spring having a bearing at each of its ends upon the bolster, and stirrups depending from said spring-bar and embracing said main spring and said auxiliary springs, substantially as described.

7. The combination, with a spring-bar, of a curved plate-spring C, having its central portion made straight and adapted to bear against said spring-bar, and two separate auxiliary plate-springs E E, each having its outer extremity secured to one end of said spring C within a bearing-shoe and its inner extremity adapted to rest upon the bolster, and the stirrups F F, depending from the spring-bar and embracing the springs C and E, substantially as described.

8. The combination, with a spring-bar, of a bolster-spring consisting of a curved plate or leaf spring adapted to rest at its central part against the spring-bar, and auxiliary curved plate or leaf springs, each of which is attached to one end of said main spring and has bearings at both of its ends upon the bolster, each of said auxiliary springs being formed with a greater degree of curvature at one of its ends than at the other, substantially as described.

9. The herein-described bolster-spring, consisting of a curved plate or leaf spring adapted to engage at its central part with the spring-bar, and auxiliary plate or leaf springs, each secured at its outer end to one end of the main spring and having its inner end adapted to rest upon the bolster, said auxiliary springs being formed with a greater degree of curvature at their outer than at their inner ends, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

NATHAN L. HOLMES.

Witnesses:
GEO. R. WEST, JR.,
W. P. PACKARD.