J. B. SMITH.

Car Spring.

No. 54,227. Patented Apr. 24, 1866.

Fig. 3.

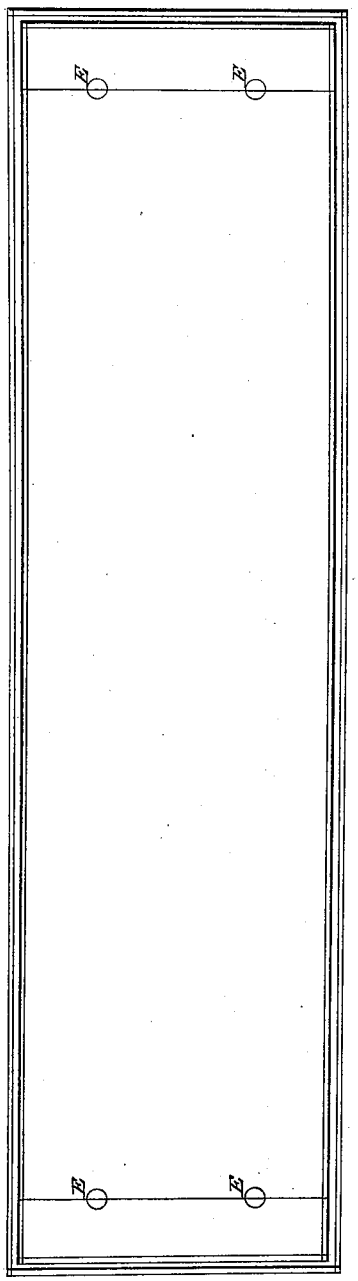


Fig. 2.

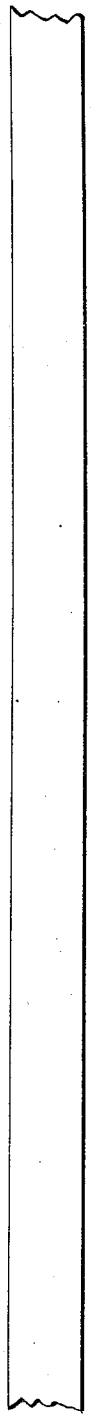
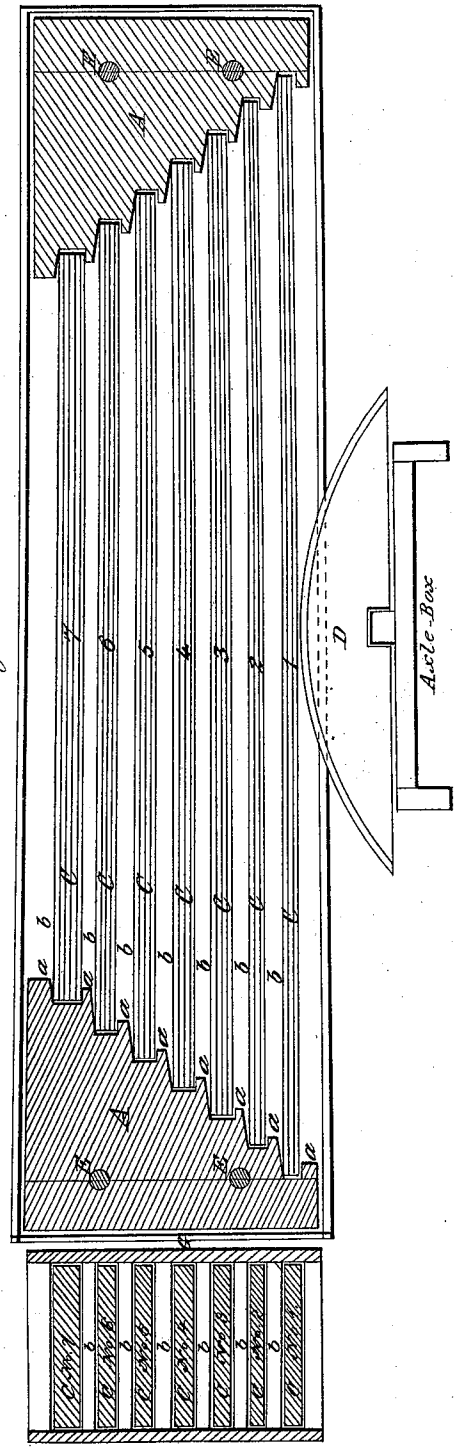


Fig. 1.



AM. PHOTO-LITHO. CO. N.Y. (OSBORNE'S PROCESS.)

UNITED STATES PATENT OFFICE.

JOSHUA B. SMYTH, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVED CAR-SPRING.

Specification forming part of Letters Patent No. **54,227**, dated April 24, 1866; antedated January 30, 1866.

To all whom it may concern:

Be it known that I, JOSHUA B. SMYTH, of the city and county of Philadelphia, State of Penusylvania, have invented new and useful Improvements in Elastic Steel Springs for Use under Railroad-Cars and other Vehicles, by the action of which a uniform gentle vertical motion is given to the car or other vehicle while passing inequalities in the road or jolts, and by the composition and arrangement of which safety, economy, and other desirable results are promoted; and I do hereby declare the following to be a full and exact description of its construction and operation, reference being had to the drawings herewith, and to letters and figures marked thereon, in which—

Figure 1 is a longitudinal elevation of the spring. A A are the fulcrums or common supports of the plates. *b b*, &c., are the elastic plates of the spring. *c c*, &c., are the intervening spaces. Detached figure *d* is a side plate, removed to exhibit the interior of the spring. D is the deflector.

Fig. 2 is a vertical section, showing the position of the plates *b b*, &c., of the spaces *c c*, &c., and the side plates, *d d*.

The nature of my invention consists in such an arrangement of elastic steel plates, one above the other, separated by intervening spaces between them, each plate rising on separate steps of a common fulcrum or fulcrums, which receive the pressure of the several plates, but only its own exerted force, and by which arrangement of the fulcrums and plates only so many of the latter are deflected as are required to equipoise the incumbent load or pressure, and no more, the remainder of the plates being at rest, consequently, the active plates being loaded, the slow motion aforesaid is secured.

To enable others skilled in the art to construct and use my spring, I append the following description.

The principle of action in my improved spring is based upon the separate individual action of the plates composing it, and the action of only so many of the plates at any given time as the weight demands to equipoise it, not on any particular shape or form of the plates or spring. These may be various.

The fulcrums or supports, having a separate step or rest for each plate, may be composed or formed in any manner that secures substantially this end and enables the plates to be deflected separately. This may be effected by means exhibited in the drawings, or by other analogous devices.

The spring may be arranged in a case or box, but not necessarily so. It may be in one or more tiers of plates. The plates may be of uniform length and thickness, or otherwise, and may be deflected upward or downward; but however shaped, formed, or composed, the principle of the independent action of the individual plates must be preserved.

Having determined the shape, form, strength, and deflection of the spring, I construct it to meet these contingencies and accommodate it to the position it is to occupy.

The spring shown in the drawings is arranged for passenger-cars. I will now describe it.

The fulcrums A A are made of cast-iron, the inner face in receding steps *a a*, &c., the bases of which decline in the angle of the deflected plate resting upon it, and will extend a little over the next succeeding plate to keep it in place. The width of the bases will be no greater than the stability of the plate requires when deflected. The height of the steps will depend upon the thickness of the plate added to the width of the intervening space. The latter will be controlled by the amount of deflection required of the spring, which deflection will be an aggregate of the widths of the spaces allotted to all the plates. The width of the fulcrums will be that of the spring. The thickness must be ample for the required pressure and wear. These fulcrums or supports are held together by side plates of sufficient strength, (detached figure *d*,) one of which may be cast in conjunction with the fulcrums and the other secured by screws after the plates are in place.

I make the elastic plates of spring-steel of suitable length to permit the required deflection without impairing materially their elasticity, and of the required width and thickness.

For passenger-cars I make plate *b* No. 1 so that all the plates of that number used under the car will equipoise the empty car, or by lightly touching No. 2, so that Nos. 1 and 2 will be the only plates deflected by the empty car. The succeeding plates will be about the same in strength, but their length will be diminished

by the shape of the fulcrums. I usually make the last plate in order (No. 7 in the drawings) more rigid than the others, for purposes hereinafter mentioned.

I make the elastic plates, exclusive of the last, in numbers and combined elastic force, so as to equipoise double the ordinary load which the spring is designed to sustain, or its proportion of the loaded car.

All the parts of the spring being completed and united, the side plate, *d*, will be securely bolted to the end supports.

The deflector D will be a convex piece of metal, a segment of a circle in form, whose height should be a little greater than the deflection of the spring, and its chord, of suitable length, will be put in position with the spring for service. The spring may now take its place under the car and be properly secured there.

The action of my improved spring is easily understood. Although the plates, when deflected, are made to touch each other, all the elicited elastic force of each plate is transferred to the common fulcrums or supports, and not to another plate, so that each plate sustains its own load only. The support rendered by plate No. 2 and all succeeding ones renders breakage very difficult, the combination giving the spring great strength.

As plates Nos. 1 carry the empty car or lightly touch No. 2, the vertical motion when passing inequalities will be slow and gentle.

Additional weight will further deflect the plates in action, and just in proportion to the weight will be the number of elastic plates active, and no more.

The active plates being heavily pressed, their motions, of necessity, must be slow.

Should extra jolts cause the last plate to be touched, its great strength will be able to change the direction without a jar, actual collapse being barely possible.

With my spring neither the quick jerking motion so common nor the jar of collapse are experienced.

I claim—

Combining a series of steel springs, whether composed of one or more plates, and so supporting them at their ends that they shall be in no part in contact with one another when without a load, and so arranging them that they shall successively be brought into action with the increase of the load, substantially in the manner and for the purpose set forth.

JOSHUA B. SMYTH.

Witnesses:
JOHN WHITE,
DENNIS MEAD.