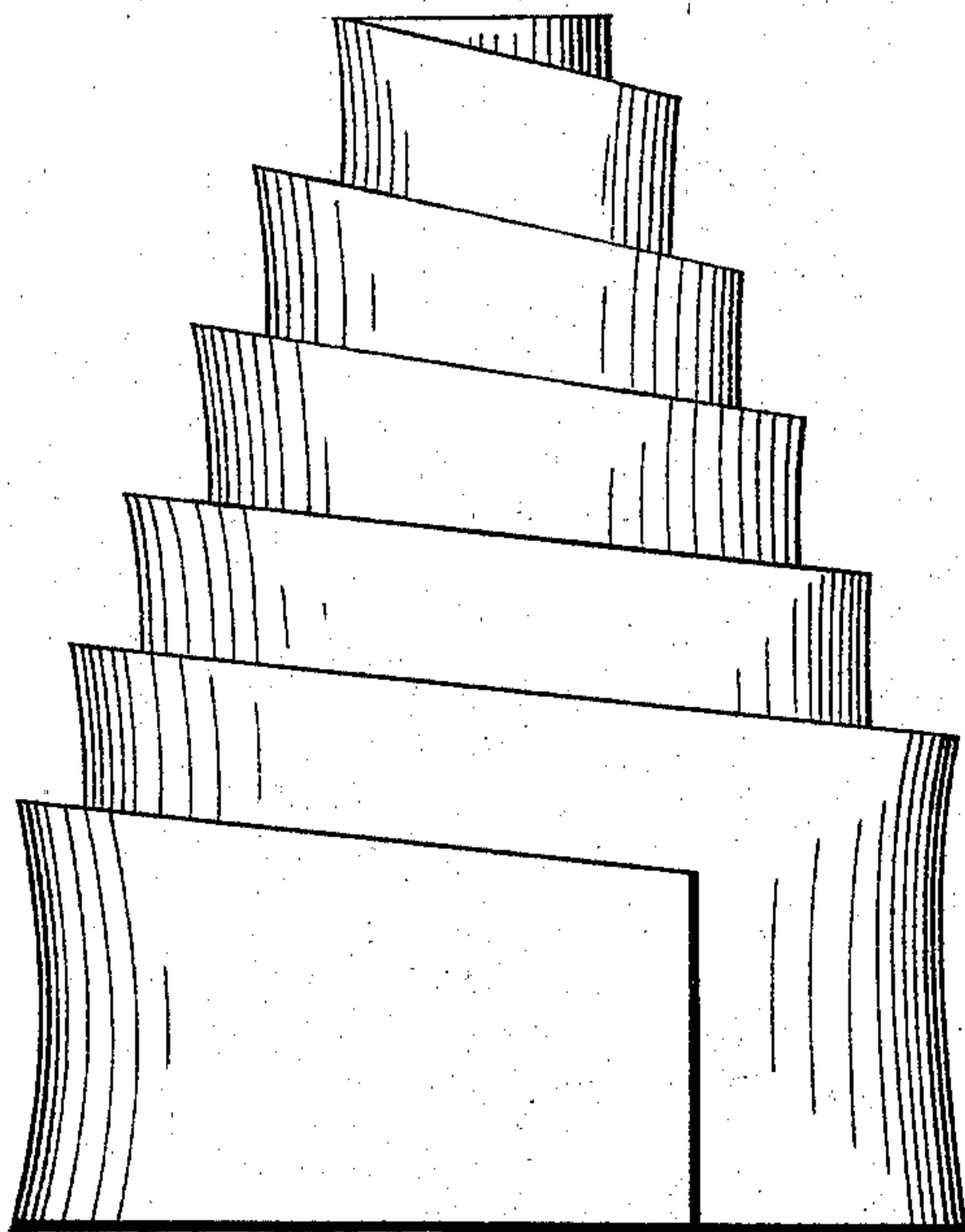


R. VOSE.  
Car Spring.

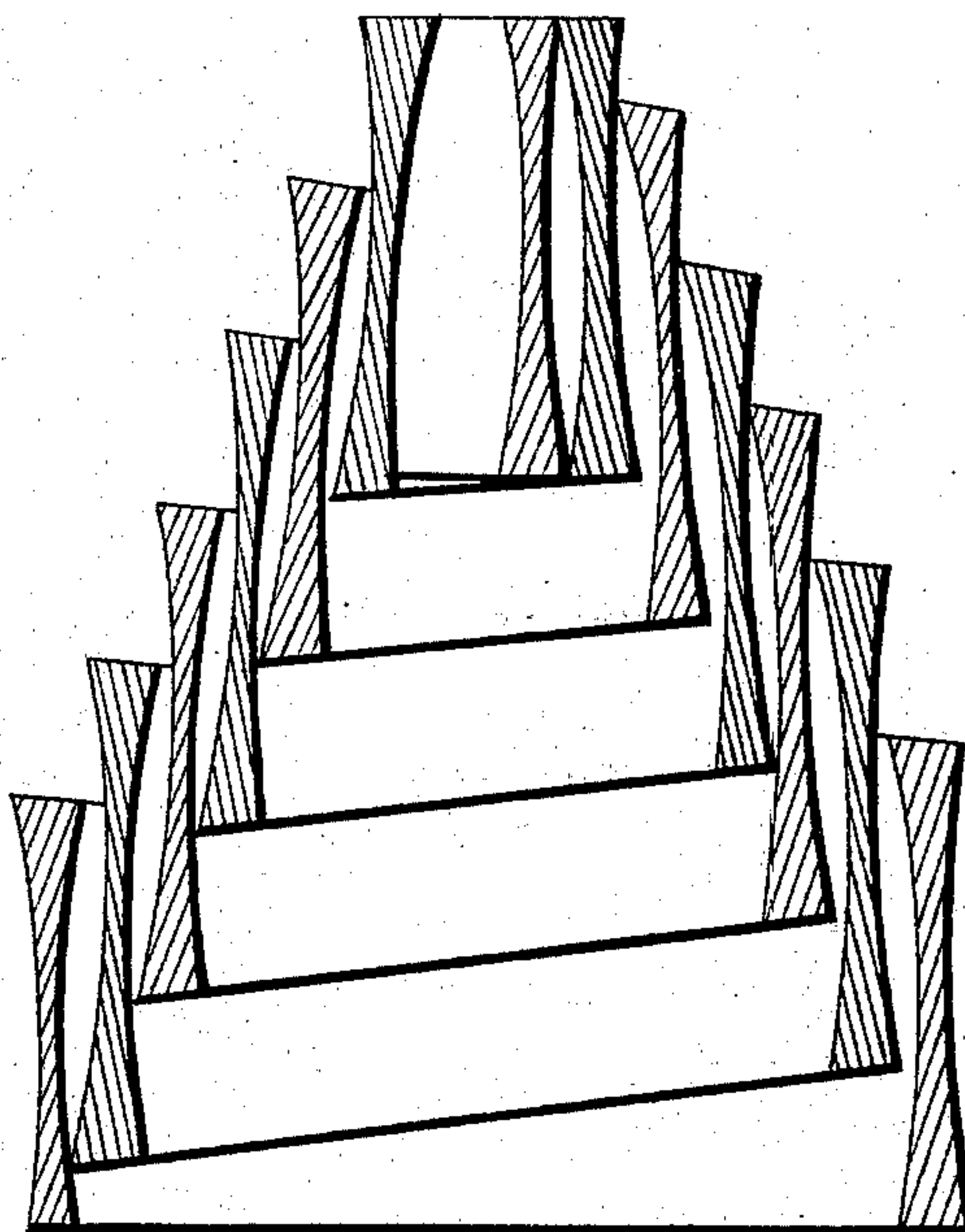
No. 68,134.

Patented Aug. 27, 1867.

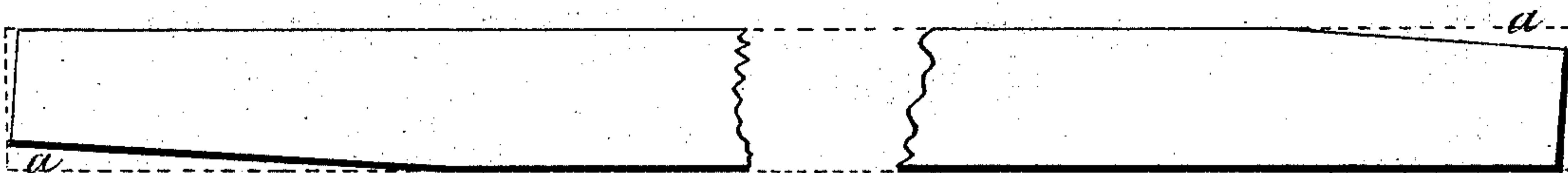
*Fig. 1.*



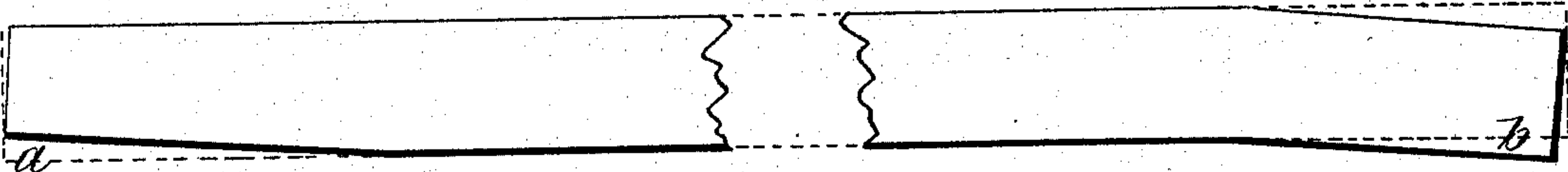
*Fig. 2.*



*Fig. 3.*



*Fig. 4.*



**Witnesses:**

*H. H. Young*  
*Julius A. Fay*

**Inventor:**

*Richard Vose*  
*Inventor*  
*By David A. Burr*

# UNITED STATES PATENT OFFICE.

RICHARD VOSE, OF NEW YORK, N. Y.

## IMPROVED CAR-SPRING.

Specification forming part of Letters Patent No. **68,134**, dated August 27, 1867.

*To all whom it may concern:*

Be it known that I, RICHARD VOSE, of the city, county, and State of New York, have invented a new and Improved Volute Spring; and I do hereby declare the following to be a full and exact description thereof, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is an elevation of my improved spring; Fig. 2, a central vertical section thereof, and Fig. 3 a diagram illustrating the form of the ends of the bar before it is coiled in the construction of said spring.

The nature of my invention relates to the shape of the bar forming a volute spring.

Heretofore volute springs have been constructed out of oblong plates of metal, as shown in Fig. 3, of uniform width from end to end, except that at the ends or opposite sides a very acute angular piece is cut from the plate, (see *a a*, Fig. 3,) so that when the plate is coiled into a spring the top and base will be in horizontal planes parallel to each other, giving to the spring at top and bottom an even bearing all around. But by thus cutting an angular piece from the end forming the inner coil, this end is left so much smaller in width that if the spring be "brought home," or compressed into the smallest possible compass, this inner coil (which receives and carries the full weight of the load) receives no support, because of its inferior width, and is consequently liable to be broken by any unusual pressure or unequal strain coming upon the center of the spring.

The nature of my invention consists, first, in bending the inner end of the bar as illustrated at *b* in Fig. 4, so that its upper edge shall have the angle heretofore obtained by cutting therefrom an angular piece, *a*, in Fig. 3; but its lower edge, instead of continuing in a right line with the remainder of the bar, shall be bent in a line parallel to the upper edge, and the width of the bar thus kept uniform to its extreme inner end, leaving the inner coil equal in width to the remaining coils, so that when the spring is compressed all the coils shall receive equal support. The bar so

formed may be made of uniform thickness, as well as of uniform width, or be transversely or longitudinally corrugated.

I have found that a more economical form of spring may be obtained by varying the thickness of the bar so as to place the greatest weight of metal at the point of greatest strain, providing, also, for a proper tempering of the spring.

My invention consists, therefore, in the second place, in making my improved spring of metallic bars rolled thinner in the center longitudinally than at the edges, in such manner as that the bar shall present transversely a double-concave section, as seen in Fig. 2 of the drawings. This form may be imparted to the bar by passing the same, in its heated state, between double-convexed rollers; and the springs may be constructed by coiling the heated bars, formed and shaped as described, upon a mandrel into a cylindrical form, and then forcing the coils from the center outwardly with a uniform pitch by means of a suitable conical punch, the spring being supported over a hollow anvil or support, the counterpart of the punch, or they may be coiled and formed upon the coiling-machine patented by C. G. Gardiner, May 10, 1857.

Having thus fully described my invention, I claim therein as new and desire to secure by Letters Patent—

1. A volute spring so constructed as that its top and base shall be in horizontal or parallel planes, and its inner coil be uniform in width with those succeeding it, substantially as herein described.

2. A volute spring constructed of a metallic bar gradually increasing in thickness outwardly from its center to its edges throughout its length, substantially in the manner herein set forth.

The foregoing specification of my improved enlarged edge volute spring signed by me this 6th day of June, A. D. 1867.

RICHD. VOSE.

Witnesses:

ALBERT L. BUTLER,  
JAS. GILLET.