

E. CLIFF.  
Car-Spring.

No. 226,597.

Patented April 20, 1880.

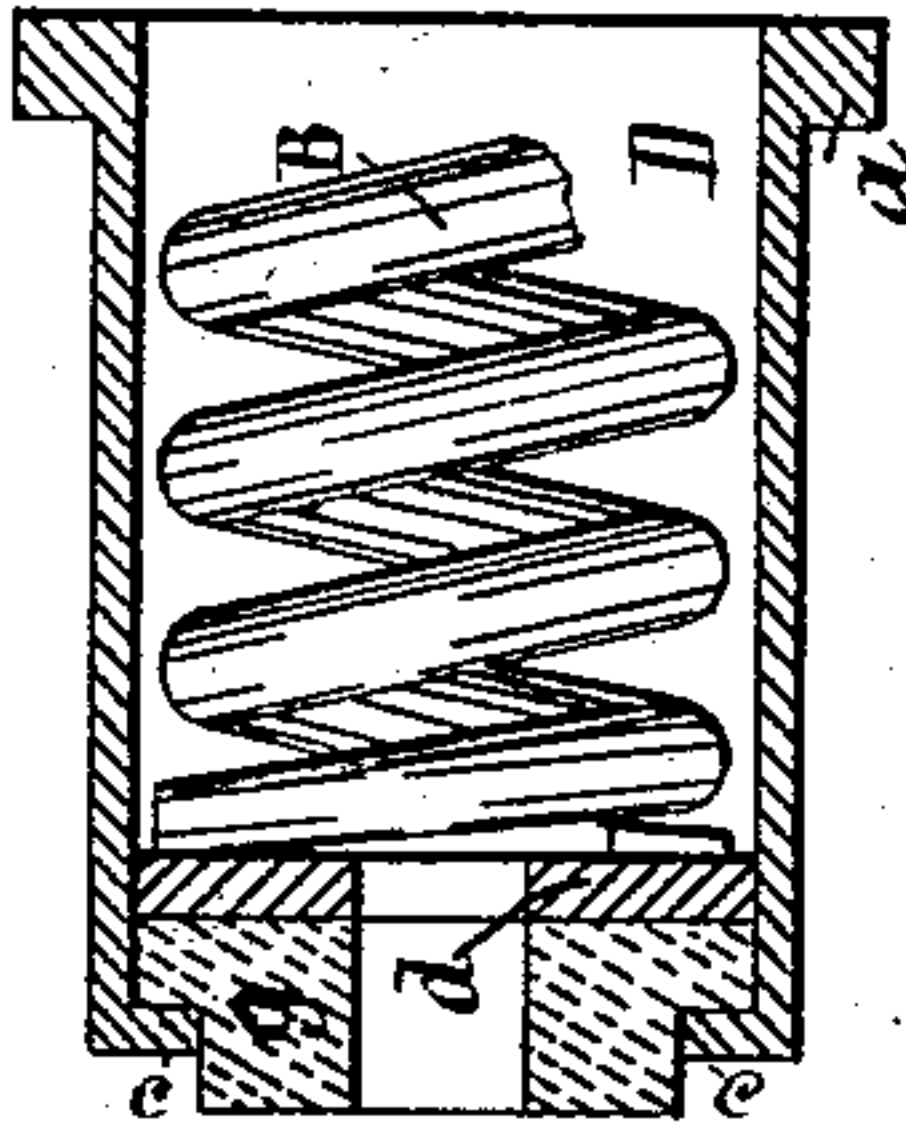


Fig. 4.

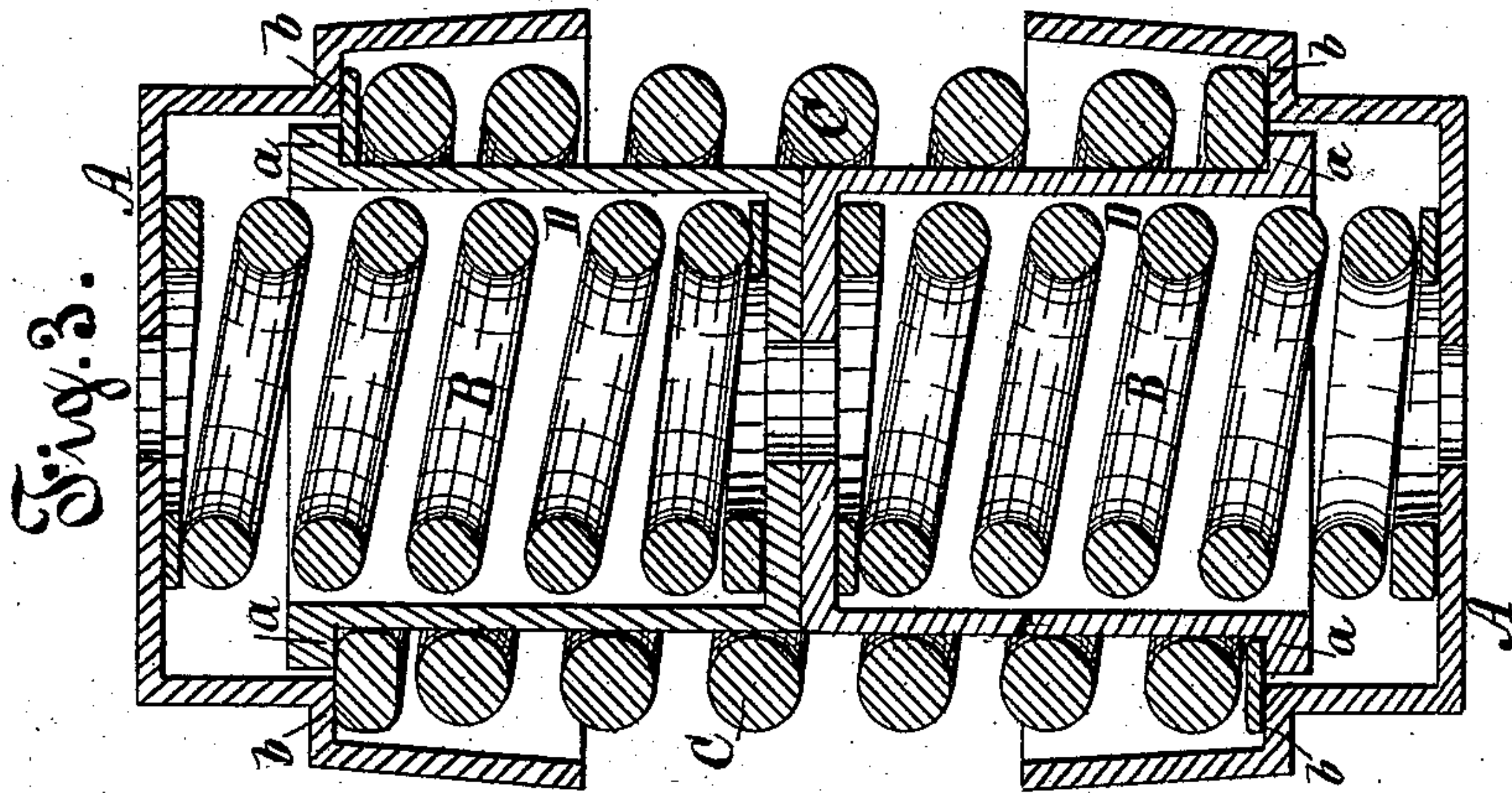


Fig. 3.

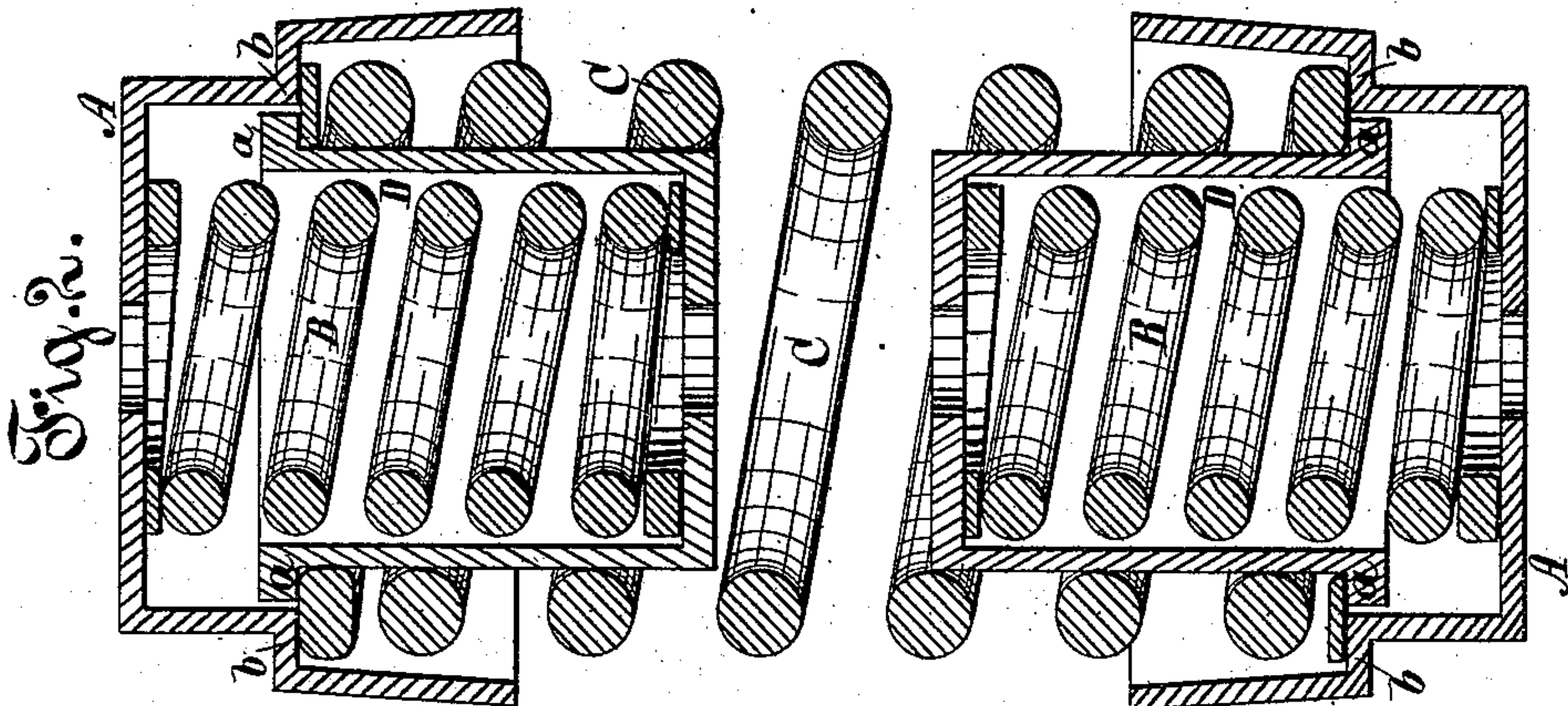


Fig. 2.

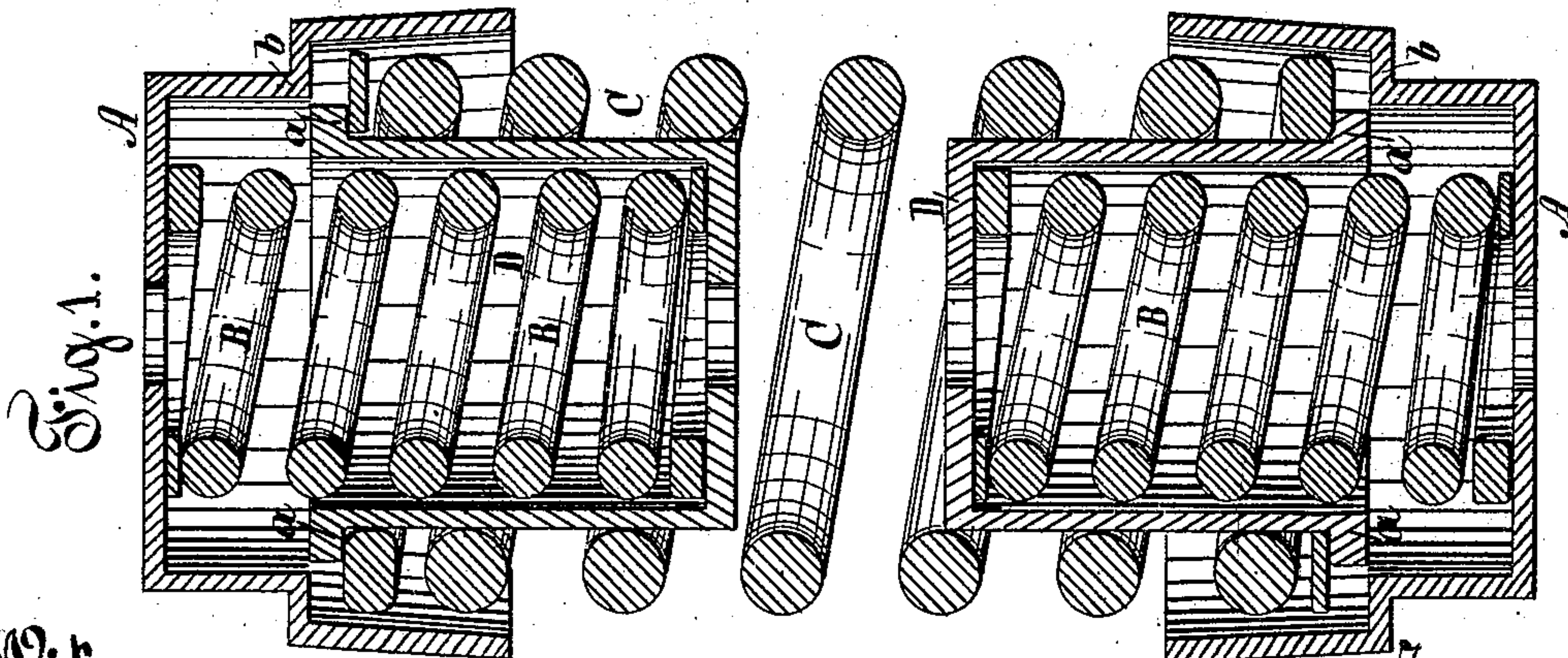


Fig. 1.

Witnesses:

Phoebe Foster.

Geo. W. Clifton

Inventor:

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By B. E. Clark

his atty.



# UNITED STATES PATENT OFFICE.

EDWARD CLIFF, OF NEWARK, N. J., ASSIGNOR OF ONE-HALF OF HIS RIGHT  
TO RICHARD VOSE, OF NEW YORK, N. Y.

## CAR-SPRING.

SPECIFICATION forming part of Letters Patent No. 226,597, dated April 20, 1880.

Application filed December 26, 1879.

*To all whom it may concern:*

Be it known that I, EDWARD CLIFF, of Newark, in the State of New Jersey, have invented certain Improvements in Springs, of which the following is a description, reference being had to the drawings accompanying the same, in which—

Figure 1 is a sectional view of my spring, showing the interior and exterior spiral springs, the cup holding the interior spiral in its place, and the cap or end covering as in their normal condition and before being weighted. Fig. 2 is a like view, showing the interior spiral in the cup and the exterior spiral when the spring is but partially weighted or loaded. Fig. 3 is a like view when the cups meet at both ends, which may be called the limit of the bearing capacity of the spring; and Fig. 4 is a side view of the cup containing or holding the interior spiral, having at one end a rubber cushion or seat for the purpose of avoiding any clicking between the ends of the cups when pressed one against the other.

My invention relates to a graduated spiral spring suitable either to railway or street cars, and so constructed that as the load is increased the two spirals are brought successively and simultaneously into action and act as auxiliaries one to the other, and are caused to do so by the construction and arrangement shown.

In the drawings, A represents the cap or covering, one at each end of the spring, and is of the shape shown, for the purpose hereinafter described. This cap rests or has its bearings, when the spring is not loaded, on the upper end of the interior spiral coil, B.

D is the cup, in which is placed the interior spiral, B, the diameter of the coil being less than that of the cup, so that its sides do not impinge on the surface of the cup, and prevent the interior from coming into contact with the exterior coil. This cup D has a flange or lip, which rests on the end of the exterior coil, C, and is marked *a*. The lower end of this cup is closed, leaving a hole for the passage of the connecting-rod, as shown in Figs. 1, 2, and 3; or the bottom may be composed of a false bottom, *d*, resting on the rubber plug *g*, which plug extends below the flanges *c c* of the bottom of

the cup, and this prevents the ends of the cup from coming in contact and clicking. The use of this rubber also serves as a medium of elasticity, as will readily be seen.

The cap A has a shoulder, *b*, formed in its sides, allowing, when the spring is not loaded, space between said shoulder and the exterior coil, the cap having its bearings on the upper end of the inner coil.

As shown in Fig. 2, when a weight or load is placed upon the cap it is pressed down on the interior coil, pressing and gathering it into the cup D. As the weight increases beyond the bearing power of the interior coil-spring, B, the cap is pressed down onto the exterior spiral till the shoulder *b* rests on the end of the said coil C; and also the coil B, pressed down into the cup to its lowest limit, causes the lips of said cup to be pressed down onto the exterior coil, thus bringing the said outer spiral into action. Then, as the load is increased, the two cups are pressed into contact at their lower end, and as the cups meet and press against each other they are by this pressure forced upward out of the coil C, thus allowing the coil B to come again into action. It will be thus readily seen that these two springs will act as auxiliaries one to the other in the action of the spring under a load.

The cup D is allowed no lateral action, and is allowed longitudinal action only when the interior coil, B, is relieved.

A group of coiled spiral spring may be employed in a cup of suitable size when greater strength is required; also, instead of steel spiral coil as an interior spring, rubber may be used as a spring.

A bolt passing down through the cap and cup and interior springs is fastened at both ends, thus holding the whole together.

When desired, one cup and interior spring only may be employed by increasing the longitude of both cup and interior coil, in which case the action will be nearly the same.

What I claim, and desire to secure by Letters Patent, is—

1. The graduating spiral spring composed of the interior coil, B, and exterior coil, C, in combination with the cup D, having flange *a*,

resting on the end of the exterior coil, B, one or more, substantially as described, and for the purpose specified.

2. The spring composed of the interior coil, B, and exterior coil, C, cup D, having flange  
5 a, resting on the end of the exterior coil, B, one or more, and the cap A, substantially as described, and for the purpose specified.

3. In a graduating spiral spring, the cup D,

having a false bottom, *d*, resting on the rubber 10 plug *g*, said plug resting on the flanges *c c*, substantially as described, and for the purpose specified.

EDWARD CLIFF.

Witnesses:

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