(No Model.)

E. CLIFF.

CAR SPRING.

No. 304,990. Patented Sept. 9, 1884.

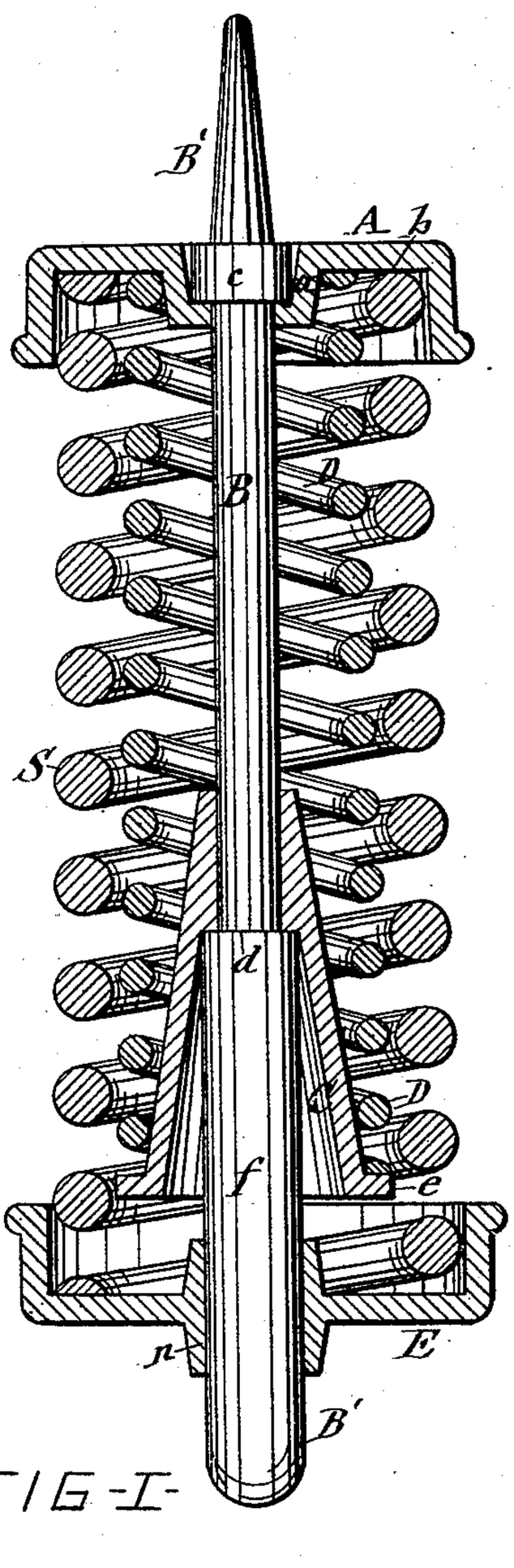

FIG-I-

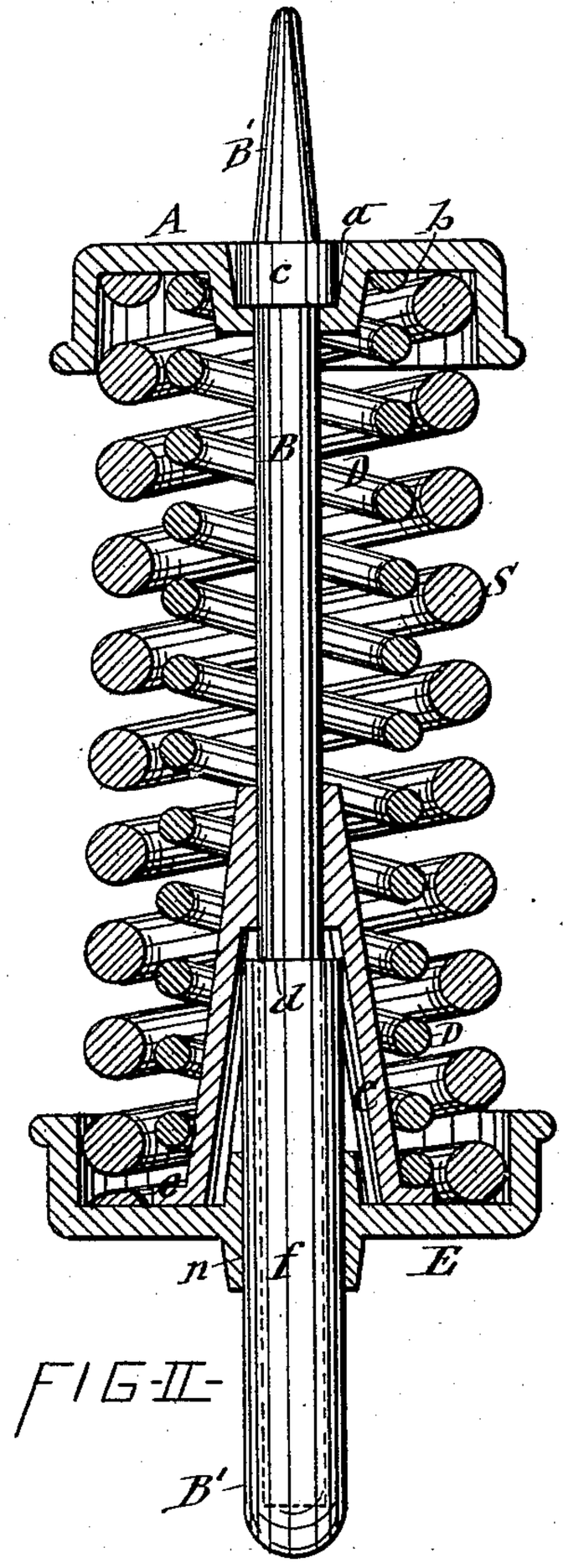

FIG-II-

WITNESSES

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Wm. C. Raymond

INVENTOR

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per Munn, Lacey & Hay

his attys

UNITED STATES PATENT OFFICE.

EDWARD CLIFF, OF OSWEGO, NEW YORK, ASSIGNOR TO THE CLIFF & RIGHTER COMPANY, (LIMITED,) OF SAME PLACE.

CAR-SPRING.

SPECIFICATION forming part of Letters Patent No. 304,990, dated September 9, 1884.

Application filed April 3, 1884. (No model.)

To all whom it may concern:

Be it known that I, EDWARD CLIFF, of Oswego, in the county of Oswego, in the State of New York, have invented new and useful Improvements in Car-Springs, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to that class of springs in which two spirals of different diameters are arranged one within the other, and are graduated either by variations of their length or by variations of the planes of their bearings, so that they are brought successively into action as the strain on them is increased.

The invention consists in an improved construction and combination of the constituent parts of a graduated compound spring, which has the internal circumference of the outer spiral in proximity to the external circumference of the inner spiral, so as to brace each other laterally without danger of binding the same or producing undue friction between them during the action of the spring, and which furthermore admits of a ready attachment and removal of the outer spiral without disturbing the inner spiral, all as hereinafter more fully explained, and specifically set forth in the claims.

In the annexed drawings, Figure I is a longitudinal section of my improved graduated spring, showing its condition when at rest; and Fig. II is a longitudinal section of the same, illustrating its action when subjected to pressure.

Similar letters of reference indicate corresponding parts.

A and E represent the end bearings on which the spring receives the pressure it is designed to resist, said end bearings being in the form of cups of different diameters and placed conversely in relation to each other, or with their cavities facing each other. The smaller cup has a central depression, *a*, forming on the under side of the cup an annular seat, *b*, for the two springs, and in the center of said depression is an eye, through which is extended a bolt, B, provided with a collar or nut, *c*, which rests in the depression *a*, the latter serving as a countersink to bring the outer face of the collar *c* flush with that of the cup A. The bolt has end extensions, B′, which enter corresponding mortises in the parts between which the spring is interposed, thereby insuring the attachment of the spring.

That end of the bolt B to which the larger cup E is to be connected has rigidly attached to it a sleeve, *f*, forming a shoulder, *d*, on which is loosely hung or seated a yoke, C, which is provided with an annular flange, *e*, and between this flange and the cup A is held the inner spiral spring, D, which is conoidal or tapering toward said cup, and sustained concentric around the bolt by the yoke and by the depressed central portion, *a*, of the cup A.

D and S designate two tapering or conical spiral springs, of different lengths and diameters, and arranged concentric one within the other. The cup E has a central eye, *n*, by which it is slipped over the end of the sleeve *f* and between this cup and the cup A is confined the outer spiral, S, which is tapered corresponding to the taper of the inner spiral, and lies with its inner circumference in proximity to the outer circumference of the inner spiral, so as to brace the same laterally. The outer spiral, being longer than the inner spiral, causes the cup E to stand some distance from the yoke C when the spring is at rest, as shown in Fig. I of the drawings.

In subjecting the spring to the end-pressure, the outer spiral, S, is first brought into action, and in the approach of the cup E toward the base of the yoke C the larger or flaring end of the outer spiral moves toward the smaller or tapering inner spiral, and consequently frees the same, as illustrated in Fig. II of the drawings, thus effectually obviating friction between the two spirals. If, after the cup E encounters the yoke C, increased strain is exerted on the spring, then the yoke is carried along with the aforesaid cup, and thus the inner spiral is brought into action to assist the outer spiral.

It will be observed that in my improved spring the inner spiral has its maximum diameter without liability of producing friction on the outer spiral, and the outer spiral can be readily introduced between the two cups A and E.

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

1. The combination of a conical spring surrounding a shorter conical spring, having its small end in the same plane with that of the outer spring, and separate and independently-movable bearings at the large end of the two springs, substantially as shown and set forth.

2. In a graduated compound spring, the combination, with two helical springs of different lengths, the shorter of which is arranged within the larger, of a plate receiving the bearings of one end of both springs, a central bolt having two collars or shoulders holding movable between them the aforesaid plate, and the bearing for the opposite end of the inner spring, and a bearing-plate sliding on the end of the bolt and receiving the bearing of the outer spring, substantially as described and shown.

3. A graduated compound spring composed of spirals of different lengths and diameters, arranged one within the other, separate and independently-movable bearings for the bases of said spirals, and a central bolt supporting one of said bearings, as shown.

4. In a graduated compound spring, the combination, with an inner tapering spiral spring, of a surrounding tapering spiral spring of greater length, and having its inner surface in proximity to the outer surface of the inner spring, and a bearing for the large end of the outer spring, arranged in a lower plane than that of the inner spring and movable independent thereof, substantially as set forth.

5. The combination of the cup A, formed with the depression *a* and annular seat *b*, the bolt B, provided with the collar *c* and shoulder *d*, the yoke C, hung on the shoulder *d*, and provided with the flange *e*, the inner spring, D, held between the seat *b* and flange *e*, the cup E, sliding on the bolt B, and the outer spring, S, of greater length than the inner spring and confined between the two cups, all constructed and combined substantially as described and shown.

6. In combination with the cup A, inner spring, D, and outer longer spring, S, the bolt B, having extensions B′, and provided at one end with the collar *c*, the sleeve *f*, secured to the opposite end of the bolt, the yoke C, seated on the inner end of the sleeve and provided with the flange *e*, and the cup E, sliding over the sleeve *f*, substantially as described and shown.

In testimony whereof I have hereunto signed my name and affixed my seal, in the presence of two attesting witnesses, at Syracuse, in the county of Onondaga, in the State of New York, this 14th day of March, 1884.

EDWARD CLIFF. [L. S.]

Witnesses:
C. H. DUELL,
F. H. GIBBS.