D. CARTER.

VOLUTE MOTOR-SPRING.

No. 192,564. Patented July 3, 1877.

Fig. 1.

Fig. 2.

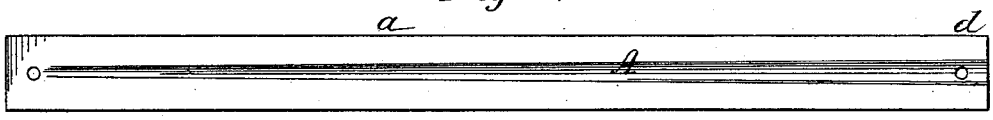


Fig. 3

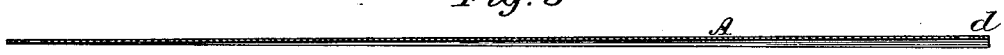


Fig. 4.

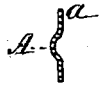


Fig. 5.

Fig. 6.

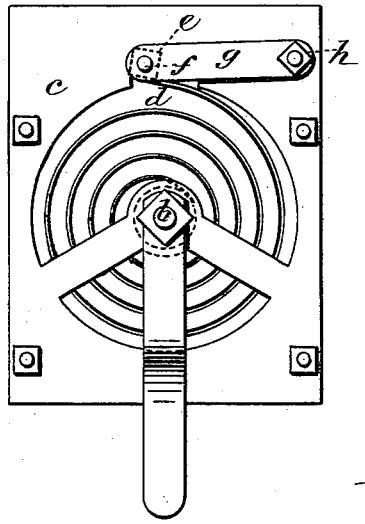


Fig. 7.

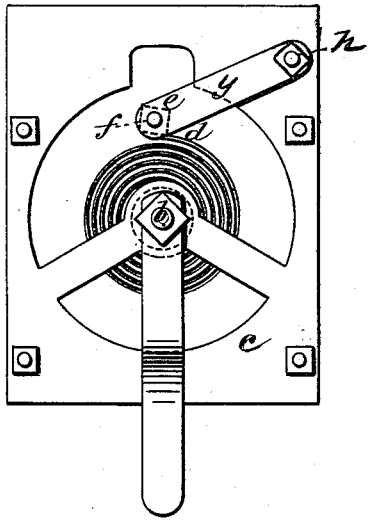
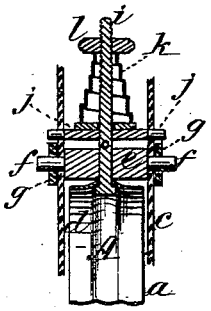


Fig. 8.



Witnesses:

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Inventor:

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his Atty.

UNITED STATES PATENT OFFICE.

DURUS CARTER, OF BALTIMORE, MARYLAND.

IMPROVEMENT IN VOLUTE MOTOR-SPRINGS.

Specification forming part of Letters Patent No. **192,564**, dated July 3, 1877; application filed May 7, 1877.

To all whom it may concern:

Be it known that I, DURUS CARTER, of the city of Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Volute Motor-Springs, which improvements are fully set forth in the following specification and accompanying drawings.

My improvements are designed to equalize and increase the power of volute motor-springs throughout their length, and thus give equalized power and increased strength to the blade from the inner to the outer coils. This I effect by giving the ordinary watch or other motor blade or ribbon one or more corrugations in the direction of their length, such corrugation or corrugations being tapered or diminished in width or in depth, or in both, from the inner to the outer hitching-point.

The degree of the taper given to the corrugation must be such as to produce the equalization of the power of the coils, or to give an excess of power, if desired, to the outer coils. To allow the outer hitched point to move toward and from the arbor with a regular, easy, and certain movement when the spring is being wound and unwound, I have devised a carrier, consisting of swinging arms pivoted to the box at their outer ends, to the inner ends of which arms the outer end of the spring is fastened, the result of which gives the outer hitching-point a certain and easy movement toward the arbor or center of the drum by reason of the arms moving in the arc of a circle, and carrying the outer hitching-point free and unobstructed, thus avoiding the binding or friction incident to slotted radial arms and guides, and allowing the blade to more readily assume a concentric form in winding and unwinding. A supplemental or independent spring device may be combined with the movable hitching-point to aid in pulling home the traveling ends of the arms in unison with the unwinding of the spring.

The object of these improvements is to render the working of the spring more perfect than heretofore attained.

Referring to the drawings, Figure 1 represents a blank or ribbon, such as is commonly used for volute springs; Fig. 2, a spring-blade, with tapering longitudinal corrugation; Fig. 3, a longitudinal section, showing the taper in the depth of the corrugation; Fig. 4, a cross-section of the same; Fig. 5, a similar section, showing several corrugations; Fig. 6, my improved spring in its box or case, showing the pivoted arms to which the outer end of the spring is hitched; Fig. 7, a similar view, showing the pivoted arms in the positions they occupy when the spring is wound upon its arbor, and Fig. 8, a section showing the pivoted hitching-arms in connection with an auxiliary spring device to give an outward pulling power to said arms, and the springs hitched thereto.

The volute spring made from the ordinary ribbon of equal width and thickness is very defective in storing up and giving off its power, from the fact that the inner coils, by reason of being of the least diameter, furnish the greatest power, while the outer or larger coils, being of greater diameter, furnish the least degree of power, and my object is to equalize the power of the coils without regard to their diameter.

In carrying out my invention I take the ordinary volute-spring blade, and, by any suitable means, give it one or more tapering corrugations, A, extending wholly or partly throughout its length—that is to say, the taper or tapers are commenced at or near the outer end, and have a graduated or diminishing taper terminating at or near its inner end.

The degree of diminution of this taper, it will be understood, should be such as to make the power of all portions of the spring equal when being wound; or, if desired, the taper may be such as to give an excess of power from the inner to the outer coils, which would give the outer coils, containing the most metal, the excess of power.

The inner end of the spring *a* is attached to the hub or arbor *b* of the box *c* in the usual manner. The outer end, *d*, however, is attached to a cross-bar, *e*, which has its bearings *f* in the ends of two arms, *g g*, hinged at *h* in the sides of the box, so as to allow their inner ends, to which the cross-bar is attached, to move up and down in the arc of a circle by the action of the winding and unwinding of the spring. The effect of this manner of hitching the spring to the cross-bar of the hinged arms is that it allows the end of the spring or

outer coil to approach the arbor or center of the spring more concentrically, and with less torsion to its metal, than the usual method of hitching the box, and helps to prevent the friction of the coils against each other in winding and unwinding.

To insure the more positive outward movement of the hinged arms, and the return of the outer coil of the spring in unwinding, an auxiliary spring device may be used, consisting of a screw-rod, *i*, rising from the cross-bar *e*, which passes through an upper cross-bar, *j*, having bearings in the sides of the box, and forms a seat for a coiled spring, *k*, through which the screw-rod *i* passes. A nut, *l*, screws upon the outer end of the screw-rod, and serves as a bearing to bring the spring *k* into action when the arms and cross-bar are drawn down by the action of winding the spring.

When this device is used the two cross-bars and the screw-rod will have a sort of oscillating movement on their bearings to conform to the arc described by the arms.

I claim—

1. A volute motor-spring, having one or more corrugations tapering from one end to the other, as set forth, to equalize and increase the power of all the coils, as described.

2. The combination, with a volute motor-spring, of hinged arms and a cross-bar, to which the outer end of said spring is hitched, for operation as described.

3. The supplemental spring device in combination with the hinged arms and a volute motor-spring, for operation as described.

In testimony whereof I have hereunto set my hand in the presence of two witnesses.

DURUS CARTER.

Witnesses:
JOHN W. TAYLOR,
C. H. SLICER.