

No. 633,328.

Patented Sept. 19, 1899.

F. E. ROBERTS.

SPRING.

(Application filed Mar. 1, 1899.)

(No Model.)

Fig. 1.

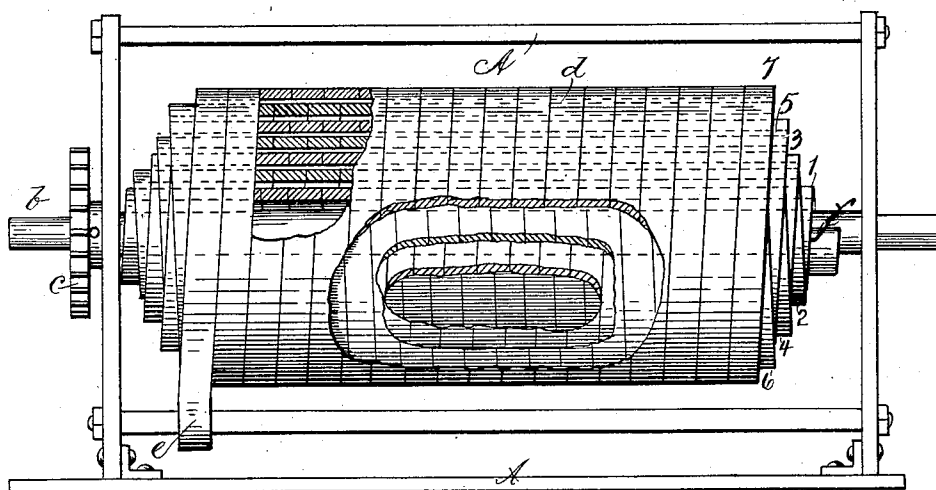
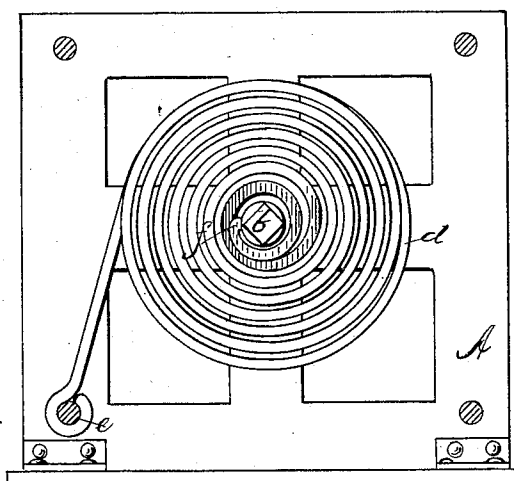


Fig. 2.



WITNESSES:

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FRANK E. ROBERTS, OF TOLEDO, OHIO, ASSIGNOR OF ONE-HALF TO MARY F. MUNSON, OF SAME PLACE.

SPRING.

SPECIFICATION forming part of Letters Patent No. 633,328, dated September 19, 1899.

Application filed March 1, 1899. Serial No. 707,292. (No model.)

To all whom it may concern:

Be it known that I, FRANK E. ROBERTS, a citizen of the United States, residing at Toledo, Lucas county, Ohio, have invented certain
5 new and useful Improvements in Springs, of which the following is a specification.

My invention relates to a compound helical spring for spring-motors; and its object is to provide a spring which in a minimum of
10 space shall have a maximum of capacity and of time limit in its unwinding.

To this end my invention consists in the construction and arrangement shown and illustrated in the accompanying drawings,
15 made part hereof, and described in the following specification.

In said drawings, Figure 1 is a side elevation of my spring with portions broken away to show several of the layers hereinafter referred to, and Fig. 2 is an end view of the
20 same with one end of the frame removed.

In the drawings, A is a frame or housing having journaled therein a shaft *b*, provided with suitable means for imparting motion to the mechanism to be driven, such as a pin-
25 ion *c*.

d is a spring secured at one end to a fixed point, as at *e*, and at the other end to the shaft to be driven, as at *f*. This spring consists of a long strip of suitable metal, such as spring-steel, and is spirally wound the desired distance along the shaft from its point of fastening. The strip is next wound in the opposite direction upon the first helix thus
30 formed to or near to the starting-point. Now the winding continues upon the second helix a suitable distance in the same direction as the winding of the first, and so on, one helix being superimposed upon another until the
35 desired number of coils is formed. The end of the outer coil is now secured to some fixed point, as at *e*. In the example of my device illustrated in the drawings there are shown seven concentric coils, numbered progressively outwardly from 1 to 7. The shaft being revolved in a direction opposite to the windings of the spring, the first layer is compressed upon or near to its shaft. The rotation of the shaft being continued, the second
40 helix is wound upon and caused to embrace

the first helix. The winding being continued, the third helix is caused to embrace the second helix, and so on until the succeeding helices are progressively compressed into working position. Now the shaft being released,
55 the outer helix 7 will first by its resiliency unwind itself and expend its energy, the next succeeding helix being held against operation until its incasing coil is sufficiently expanded to release the first winding of the next succeeding coil 6. This coil now proceeds to unwind itself in the same manner as did coil 7 until its clasp upon the next inner coil 5 is released. In this manner coil after coil is released and thrown into operation by the unwinding of the outer inclosing coils until finally the inner helix is permitted to unwind itself. As coil after coil unwinds itself motion is imparted to the shaft and to its connected gear.
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It will be seen that from a single piece of metal I have constructed a spring which approximately from the beginning to the end of its operation delivers to its shaft a uniform thrust or pull, that the several sections of the same spring operate successively, that the space occupied by the spring is small, and that the unwinding of the several superimposed sections or layers will consume a considerable period of time.
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The shaft may after the spring is wound up be rigidly secured against rotation, and the housing may be revolvably mounted upon the shaft and connected with a driving mechanism with substantially the same result as with the arrangement above described without departing from my invention.
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Having described my invention, what I claim, and desire to secure by Letters Patent, is—
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A spring, comprising a strip of metal, spirally wound in a plurality of concentric layers or helices, one layer or series of windings being superimposed upon another, substantially as described.

FRANK E. ROBERTS.

In presence of—

F. M. DOTSON,
L. E. BROWN.