F. J. MILLEA.

SPRING.

APPLICATION FILED JAN. 20, 1915.

1,172,948. Patented Feb. 22, 1916.

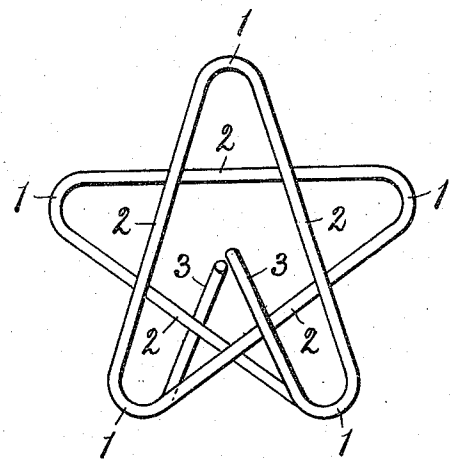


FIG. 1.

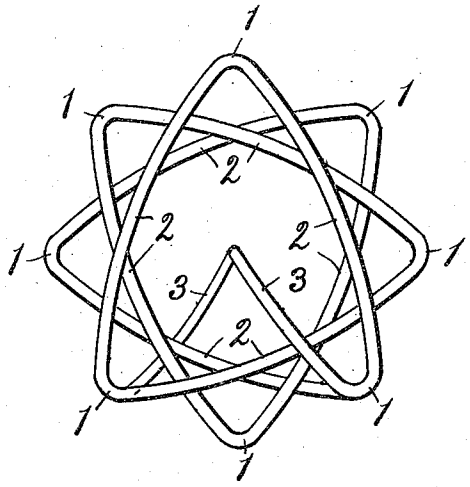


FIG. 2.

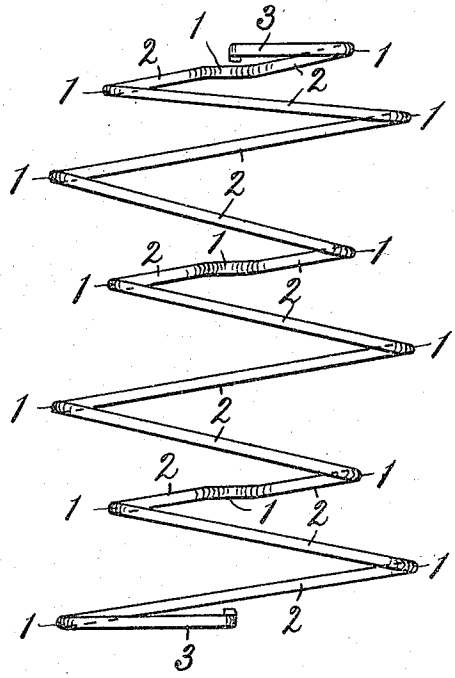


FIG. 3.

WITNESSES:

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SPRING.

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To all whom it may concern:

Be it known that I, FRANCIS J. MILLEA, a citizen of the United States of America, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented a new and useful Spring, of which the following is a specification.

My invention relates to improvements in springs designed for use in the upholstery art, and many other arts as well, and resides in a spiral spring consisting of a plurality of acute-angle coils each of which embodies three angles or bends, and the relative arrangements of which bends are such that any given bend is out of line with vertically or in offset relation to any adjacent bend on either the horizontal plane above or such plane below said given bend, all as hereinafter more fully set forth.

The objects of my invention are, first, to produce a spiral spring which possesses longitudinal expanding and contracting qualities or capabilities in the usual and required degrees, is compressible into a compact space in the direction of its axis, has a large amount of torsional flexibility or resiliency, and is exceedingly sensitive to lengthwise pressure applied at peripheral points or points between the axis and periphery, readily closing on the side under compression or in the line of compression and opening on the opposite side, and, when released, with equal facility assuming its former and normal condition and resuming its former and normal shape; and, second, to provide a spiral spring with ample attaching parts so arranged that the attaching means applied to the spring, whether of wire, fabric, or other material, can not be caught between contiguous portions of the spring, when the latter is compressed, and cut or worn by the action of such portions thereon. This spring is exceedingly mobile and has a great range or variety of direction of mobility, but these characteristics or capabilities are not gained at the expense of strength, or of the power needed to recover and remain normal when released and left free, or of any other desirable quality. The spring, as hereinbefore intimated, is particularly well adapted for use in the manufacture of beds, chairs, and other upholstered articles, but is by no means limited to such use, being equally useful in a wide field entirely outside of that of which definite mention has been made.

Other objects and advantages will appear in the course of the following description.

I attain the objects and secure the advantages of my invention by the means illustrated in the accompanying drawings, in which—

Figure 1 is a top plan or end elevation of a spring that embodies a practical form of my invention; Fig. 2, a similar view showing another practical form of said invention, and, Fig. 3, a side elevation of the spring shown in the first view.

Similar numerals refer to similar parts throughout the several views.

The construction and arrangement of the acute-angle coils in the spring shown in Figs. 1 and 3 are such that a five-pointed configuration appears in plan, while the construction and arrangement of the acute-angle coils in the spring represented in Fig. 2 are such that an eight-pointed configuration appears in plan. These are only two of a number of possible configurations to which the spring is susceptible, some regular and some irregular as to alternate adjacent bends, and I do not, therefore, intend to be limited to any particular configuration or number of points or bends therein, neither do I intend to be confined to the shape or size of the spring and its parts or members, beyond the limits herein defined and set or fixed by my claims.

The spring in each case illustrated, and in every other case as well, consists of a plurality of acute-angled convolutions or coils, each being bent three times, at an acute-angle each time, to form three bends 1. The bends 1 are connected by reaches 2, and the parts and members are so arranged that said bends are in offset relationship, so that any one of them projects beyond one of said reaches between two bends and located either above or below, or from between two of such reaches, and is never directly over or under another bend without an intervening reach. The spring is formed from a

single wire, and the terminals of such wire may be carried inwardly to central points, or otherwise disposed, to serve as fastening or attaching members, such members being here represented at 3—3.

It will now be seen that, when the spring is compressed, the bends 1 never come into contact with each other, consequently any fastening medium that may be attached to the bends at the ends of the spring never becomes abraded, any more than do any fastening means that may be attached to the terminal members 3. It will be seen, furthermore, that, inasmuch as the coils only touch each other at the points where the reaches 2 cross each other, when the spring is compressed tightly or fully, instead of touching at all points as in a common spring, the compression capacity is greater.

In an ordinary spring the torsional flexibility is uniformly distributed, or rather is distributed throughout the entire spring, so that said spring yields or expands or contracts, as the case may be, at all points, while in my spring contraction or expansion mainly takes place at the bends 1 only, which fact is responsible for the increased torsional flexibility of the latter spring.

The enhanced lateral flexibility lengthwise of the new spring, or, in other words, the enhanced rocking action thereof or its great capacity to yield or close in any line of direction which is parallel with the spring axis and at the same time to open up or expand on the opposite side, is, of course, due to the overhanging bends 1 and the intervening reaches 2.

The reaches, or those portions of the same that are between the bends 1, are approximately straight, even when bowed as shown in Fig. 2, the shape of said reaches and of said bends as well, within certain limits, not being essential so far as the present invention is concerned, as hereinbefore intimated.

In this construction at least three fastening or attaching points are afforded at each end, besides the member 3 if present, by the three bends 1 at such end, and every bend 1 in the spring can be utilized to the very best advantage for a point of attachment wherever or whenever necessary or desirable, since the bends are so well adapted for this purpose.

This spring is very lively in endwise expansion and compression, as well as in its movements in other directions, and, although the coil displacement under endwise expansion or contraction is not so uniformly distributed throughout the entire device in the new type of spring as in the old type, the requisite strength and power of recovery are present in the new as well as in the old. There is, of course, more torsional action of the wire in the bends 1 than in the wire between such bends, during the expanding and contracting operations of the new spring longitudinally, but as just intimated this fact in no way impairs the utility of the spring, on the contrary the utility is enhanced thereby.

Another advantage possessed by my spring is found in the facility with which it adapts itself or may be adapted to compound motions or movements, that is to say, the readiness with which said spring can be expanded and contracted, either or both, in more than one direction at the same time, it being a simple matter simultaneously to stretch or compress the spring longitudinally and rock it in any direction, or simultaneously to stretch or compress and twist in either direction, or simultaneously to rock and twist, or simultaneously to do all three of these things with the spring. This is one of the valuable and important features of the invention.

The spring, when intended for an extension or expansion spring lengthwise in the direction of its axis, may be made so that the coils are normally close together or closed, as is the case frequently with other springs. The spring shown in Fig. 3 is adapted for initial lengthwise expansion and contraction both.

The terms "acute-angle", "acute-angular" and "acute-angled" as herein employed indicate the relationship that exists between directly connected reaches of the coils, regardless of the configuration of the apexes which unite such reaches, that is, the bends 1, which are usually curved to a greater or less degree.

Spiral springs of the conical type are very liable, when subjected to hard usage or even tipped, to distortion of such a nature that their coils become tangled in such a manner as to prevent proper expansion or recovery, with the result that the springs are greatly impaired, if not rendered practically useless. Entanglement of the coils of my spring is not possible, so long as the spring retains any semblance of itself, and herein is found an additional advantage of my construction that is important and valuable.

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

1. As an improved article of manufacture, a spiral spring consisting of a plurality of acute-angled convolutions arranged with their bends in offset relationship.

2. As an improved article of manufacture, a spiral spring consisting of a plurality of coils each of which has three bends therein, the arrangement being such that each bend is out of line with an adjacent bend either above or below the same.

3. As an improved article of manufacture,

a spiral spring the coils of which consist of substantially straight connected reaches arranged in acute-angular relation to each other, and with adjacent apexes, lengthwise of the spring, out of line with each other.

4. As an improved article of manufacture, a spiral spring the coils of which consist of reaches arranged in acute-angular relationship, and of bends arranged to project beyond said reaches.

FRANCIS J. MILLEA.

Witnesses:
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."