Feb. 27, 1940. L. C. PESKIN 2,192,101

SPIRAL SPRING

Filed June 8, 1937

FIG. 1.

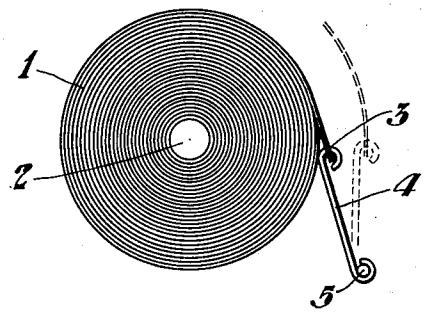


FIG. 2.

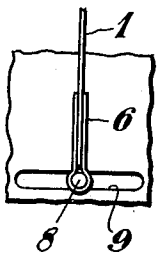


FIG. 2a.

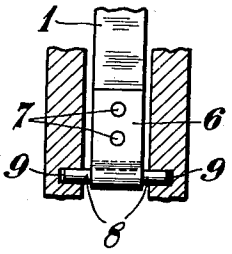


FIG. 3.

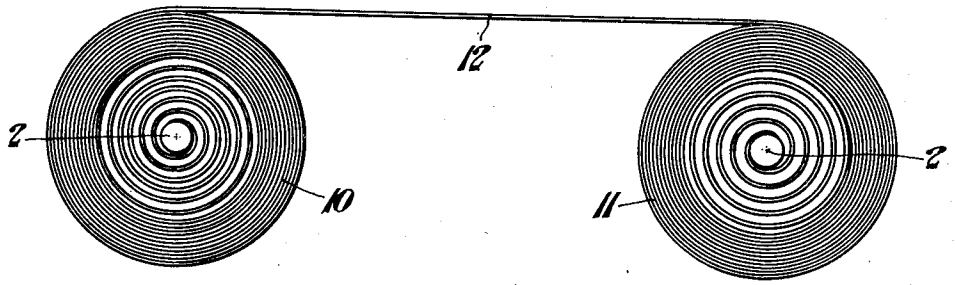


FIG. 4

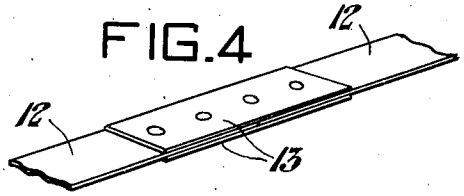
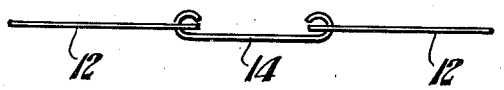


FIG. 5.



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SPIRAL SPRING

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2 Claims. (Cl. 267—1)

This invention relates to the use of coil springs for powering purposes, such as their use in watches, clocks, and to power automatic moving picture cameras. One of the objects is to use all of the available elastic energy of bending provided by such springs. Another object is to reduce the friction existing between their adjacent convolutions during coiling and uncoiling. Other objects may be inferred.

The accompanying drawing illustrates three specific examples of coil springs embodying the features of the present invention, the various figures being as follows:

Figure 1 is a side view of the first example.

Figures 2 and 2ª illustrate a second example in side and sectional views, respectively.

Figure 3 is a third example.

Figures 4 and 5 are modifications of this third example.

In the case of the first example, the inner end of a coil spring 1 is fixed to a suitable shaft or spindle 2, and its outer end is apertured as at 3, so as to provide an opening through which a bent end of a wire link 4 may be passed, the other end of this link being similarly bent and anchored by a pivot pin 5. The position of this pivot pin and the length of this link are such that its end connecting with the outer end of the coil spring swings in a substantially radial direction respecting the axis of the coil spring. It will be noted that this link 4 pivots respecting both the outer end of the coil spring and the anchoring pivot pin.

As a result of the above arrangement the outer end of the coil spring is anchored against tangential movement respecting the spring but is entirely free to move radially towards and from the spring while the latter is coiling and uncoiling, the rate of this movement being approximately proportional to the rate of coiling and uncoiling of the spring, while the extent of the movement is between two extreme positions respectively spaced from the axis of the coil spring distances substantially equaling the diameters of the spring in its coiled and uncoiled extremes. The method of operating the coil spring thus involved is obviously different from the usual arrangement wherein the outer end of the coil spring is held not only against tangential movement respecting the spring but against radial movement as well.

When the outer end of the coil spring is fixedly anchored in the usual manner, a considerable length of the spring remains after coiling which undergoes no bending as a curved bar but which is essentially a straight beam between its fixed end and a relatively remote point of tangency on the coiled remainder of the spring, and under such forces as to result in a large amount of friction being created by the various convolutions being virtually pushed against one another, whereby a great deal of the available elastic energy of bending in the coiled spring is absorbed in overcoming this friction. Furthermore, when the outer end is fixed the relatively straight length of wire left at this outer end after coiling contributes little to the useful elastic energy of the spring as a whole, this energy being mainly the result of the changes in radii undergone by the curved portions of the spring during the uncoiling operation. These various effects also result in stress concentrations frequently leading to premature spring breakages.

The present invention which teaches freeing the outer end of the spring to movement or floating action radially respecting the spring, while holding this end against tangential movement respecting the same, permits the spring to act more nearly as a continuously curved beam throughout its entire length, whereby the ineffective straight piece of spring otherwise remaining at the end of the coil is eliminated. Also, because of the radial freedom of the end of the spring undesirable radial forces are eliminated at this point, which results in a more concentric seating of one coil convolution upon another during coiling, friction between adjacent convolutions of the spring is considerably reduced and the stresses are uniformly distributed. It follows that the present invention considerably increases the efficiency and life of a coil spring as contrasted to the characteristics of the same spring when its outer end is fixedly anchored.

A further advantage incidental to the invention is one pertaining to the manufacture of the spring. This follows from the fact that it is not necessary to anneal the ends of the spring lengths to provide the shaped ends heretofore necessary in many of these springs, it being possible to cut the hardened steel strip from which the spring is made while, at the same time, punching the opening required for the link.

In the case of the second example of the invention, the outer end of the spring 1 is sandwiched between the ends of a looped strip 6, by means of rivets 7, the anchorage being effected by a pin 8 passed through this loop and riding in a straight guideway 9 extending radially respecting the axis of the coil spring. This guideway 9 may be provided by suitable slots formed in the

spring housing where the latter is used or can be used. In the case of this example, the pin 8 moves or floats radially to provide the results of the swinging end of the link 4 in the case of the first example.

The third example consists of two coils 10 and 11 of spring metal strip arranged with their outer convolutions interconnected by a straight section 12 extending tangentially from one of the coils to the other. The two coil springs thus provided may be formed from a single length of strip or may be formed from separate pieces with their respective ends spliced together, as at 13, or interconnected by a wire link 14, these latter two arrangements constituting the first and the second modifications of this third example. It is obvious that during the simultaneous coiling or uncoiling of coils 10 and 11 through the mechanism of an interconnecting gear works or similar device the straight section 12 anchoring their respective outer ends may float radially respecting the working coil while, at the same time, the necessary tangential anchoring is effected.

It is to be understood that although preferable, it is not necessary to anchor the springs completely against tangential movement. Some slight tangential movement will not result in inoperativeness.

I claim:

1. The combination of a spiral spring having an outer end of approximately the same hardness as the remainder of the spring and through which a hole is formed, an anchored pin spaced from said end in approximate alignment therewith, and a wire link having bent ends respectively engaging said pin and said end, the latter being engaged by way of said hole, said link pivoting on said pin and pivotally swinging with said end during working of said spring.

2. The combination of a spiral spring having an outer end of approximately the same hardness as the remainder of the spring and through which a hole is formed, anchored pivot means spaced from said end in approximate alignment therewith and a link having one end bent and engaging said end of said spring by way of said hole and its other end connecting with said means, said link pivoting respecting said means and pivotally swinging with said end during working of said spring.

LEONARD C. PESKIN.