No. 895,492. PATENTED AUG. 11, 1908.

P. J. NEATE.

SPRING.

APPLICATION FILED MAY 18, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

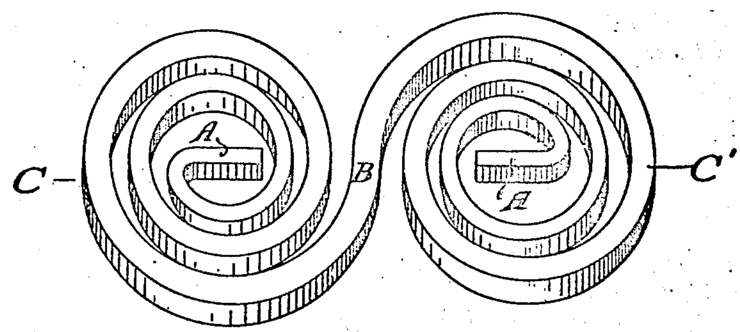


Fig. 2.

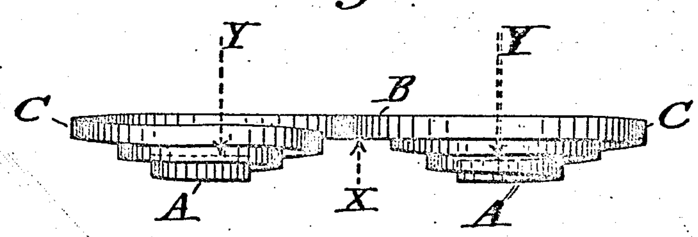
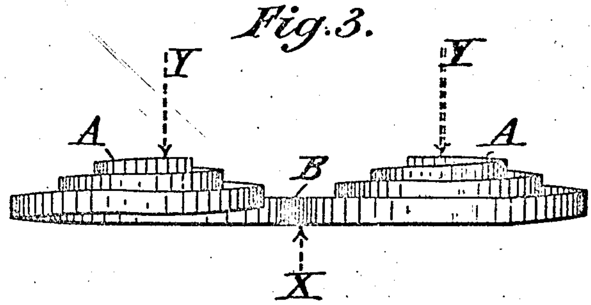


Fig. 3.



WITNESSES:

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2 SHEETS—SHEET 2.

Fig. 4.

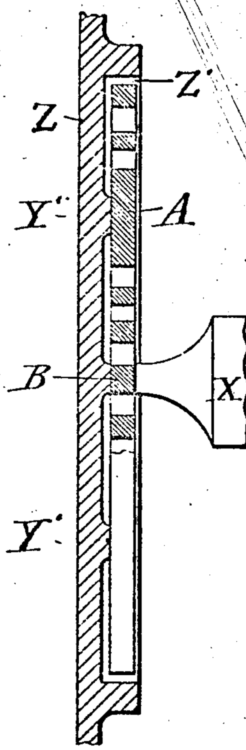


Fig. 5.

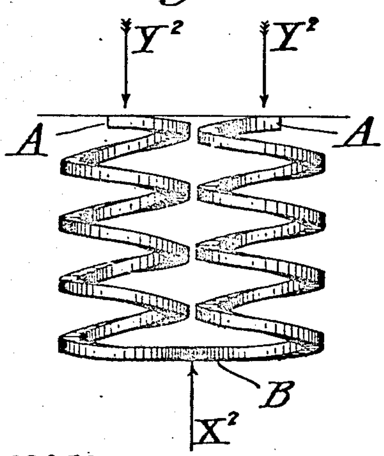
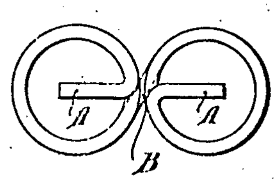


Fig. 6.



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UNITED STATES PATENT OFFICE.

PERCY JOHN NEATE, OF ROCHESTER, ENGLAND.

SPRING.

No. 895,492. Specification of Letters Patent. Patented Aug. 11, 1908.

Application filed May 18, 1906. Serial No. 317,631.

To all whom it may concern:

Be it known that I, PERCY JOHN NEATE, of "Belsize," Watts avenue, Rochester, in the county of Kent, England, engineer, have invented certain new and useful Improvements in Springs, of which the following is a specification.

This invention relates to springs of the coiled type and particularly to those of volute form and has for its object to overcome the objectionable features of the ordinary coiled spring where the ends rest upon supports, in which case nearly a whole coil at each end has to abut or rest upon the support with a resulting loss of resiliency in the portions so resting, technically termed the dead ends, the said portions also taking space which renders the use of short springs objectionable owing to the inefficient ends forming a large proportion of the whole.

The present invention relates to a construction of spring and means for mounting it, in the preferred form of which the dead ends are almost entirely eliminated, so that practically the whole spring is resilient.

In carrying the invention into effect I provide a spring which is preferably constructed of two coils, formed of a continuous strip or bar of metal, the coils being arranged side by side with their axes suitably spaced apart, and having a connecting portion at one end which preferably passes obliquely or tangentially from one coil to another. The coils may be cylindrical, conical or flat and in either of the latter cases, the tangential portion preferably passes from the outermost convolution of one coil to the outermost convolution of the other. I have found that if such a spring be in effect loaded at or near the connecting portion, the stresses mutually oppose each other so that such stresses may be balanced, and the coils do not tend to displace themselves. In this construction practically the entire end of each coil is resilient. Preferably the spring is loaded at its opposite end as near the axis of each coil as convenient, and for this reason the end of each coil is preferably carried to a point as near the axis of the spring as is practical. My invention hence comprises the combination of such a spring with a means for loading it which will effect the desired result.

In the drawings wherein I have shown several forms of my invention, Figure 1 is a perspective view of a flat spiral or volute spring adapted for use in connection with my invention; Fig. 2 is an elevation illustrating the spring of Fig. 1 when stressed in accordance with my invention; Fig. 3 illustrates a conical spiral or volute spring unstressed; Fig. 4 is a view partly in section illustrating the method of mounting the spring shown in Fig. 3; Fig. 5 shows an elevation of a helical spring illustrating the method of loading, and Fig. 6 shows a plan of the spring of Fig. 5.

Referring first to Figs. 1 and 2, let C, C′ designate the two coils of a spring which are connected by a tangential or oblique portion B. Preferably in this type of spring the portion B joins the outermost convolution of each coil. The inner end of each coil is preferably brought as near as possible to the axis of the coil as indicated at A. This type of spring is normally flat and is intended to be loaded so that under a stress the coils assume a more or less conical form. In Fig. 2 is shown the preferred method of loading such a spring. The spring is supported preferably on its under side by an abutment which takes approximately the position of the arrow X, that is to say at or near the connecting portion B while the load is applied to the axial portions A, A approximately as indicated by the arrows Y, Y.

In Fig. 3 wherein a normally extended spring is shown, a similar method of loading is best adopted. In this case the stress of the load tends to flatten the spring.

In Fig. 4 I have shown a means for loading the spring of Fig. 3 which corresponds to that diagrammatically shown in the latter figure. In Fig. 4, Z indicates a suitably formed plate having a recess Z′ in which the spring is placed. Within the recess are formed two supporting points or abutments Y′, Y′ which are adapted to contact with the end portions A, A of the coils as shown. The abutment X′ is shown as contacting with the tangential or oblique portion B. The abutment X′ may bear against substantially the entire connecting portion B or several abutments spaced apart may be used with like effect. It is obvious that the abutment or abutments may bear against such portion at any part of the latter as at the points of juncture between the portion B and the uppermost convolutions of the coils. The spring is shown in Fig. 4 as being compressed to its limit so that it is in a flat condition. At the same time it is actively resilient and tends to move the abutment X′ outwardly. As thus mounted the stresses on the coils tend to normally balance each other so that the spring maintains its normal position during the conditions of use. It is ordinarily not even necessary to fix it to either of its supports. It is quite obvious that instead of using the raised abutments Y′, Y′, the spring could be permitted to lie against a flat plate. Under these conditions the effective points of support would remain at the points Y′, Y′ so that when the spring was slightly extended it would contact substantially only at these points. The same is true of the abutments X′. If a flat plate were used and the spring were compressed into the condition shown in Fig. 4, such plate might contact with the entire side of the spring. However, upon a very slight extension the effective abutment would become the part of the plate which was in contact with the portion B or the parts near such portion. It will therefore be seen that there is no necessity of forming the ends of the coils so that they are flat or dead since the spring is adequately supported on the three points mentioned and does not become distorted or ununiformly stressed. It should be noted in this connection that the support X′ should not be so shaped as to contact with any considerable proportion of the ends of the coils when the latter are extended. If the support X′ be so shaped, or be formed of material which permits the spring to embed itself so as to practically contact with the entire end of each coil in the extended position of the spring, such coils become practically dead and the advantages of the invention are either wholly or partly lost.

Referring to Figs. 5 and 6 which show my invention as applied to a spring composed of two helical coils, it will be noted that the same mode of loading the spring is availed of. The arrows Y^2, Y^2 indicate the position of the load at one end of the spring, and the arrow X^2 indicates the position of the support of the other end of the spring.

While I have illustrated several forms of springs which are suitable for use in connection with my invention, it will be understood that the latter is applicable to torsional springs of any known type, either formed in one piece or joined solidly together, so that each spring will counterbalance the torque at the junction as if it were a dead end without being actually dead. Preferably the so called dead ends of the springs are entirely omitted so that the full advantage of the invention may be gained. It will also be understood that should it not be convenient to place the points of support equidistantly, the stiffness of the respective coils may be varied to suit the proportion of the total load which each of the coils is required to carry. It will also be understood that the bar or strip of metal from which the coils are formed may be of any desired cross-section, such as circular, oval, rectangular or the like. Such bar may also be tapered or narrowed from the junction to the termination of the coils as desired. In volute or conical springs it is desirable to taper the bar or strip in such manner that the torsional strength of any point shall be proportional to its distance from the axis of the coil.

What I claim is:—

1. The combination of a spring composed of two single coils connected together by a portion extending obliquely from one coil to the other, so that such coils lie substantially on opposite sides of said oblique portion, and means for mounting such spring including an abutment adapted to bear substantially entirely against said oblique portion when the spring is extended.

2. The combination of a spring composed of two single coils connected together by a portion extending obliquely from one coil to the other so that such coils lie substantially on opposite sides of said oblique portion, each of said coils having its opposite end extended to or near its axis, and means for mounting such spring comprising abutments acting against the axially extended ends of the coils and an abutment acting substantially entirely against said oblique portion when the spring is extended so as to be substantially out of contact with the convolutions of the coils.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

PERCY JOHN NEATE.

Witnesses:
HENRY ALLEN PRYOR,
ROBERT MILTON SPEARPOINT.