Feb. 20, 1945. T. G. STOUDT 2,370,111

COIL SPRING APPLIANCE

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Fig. 1.

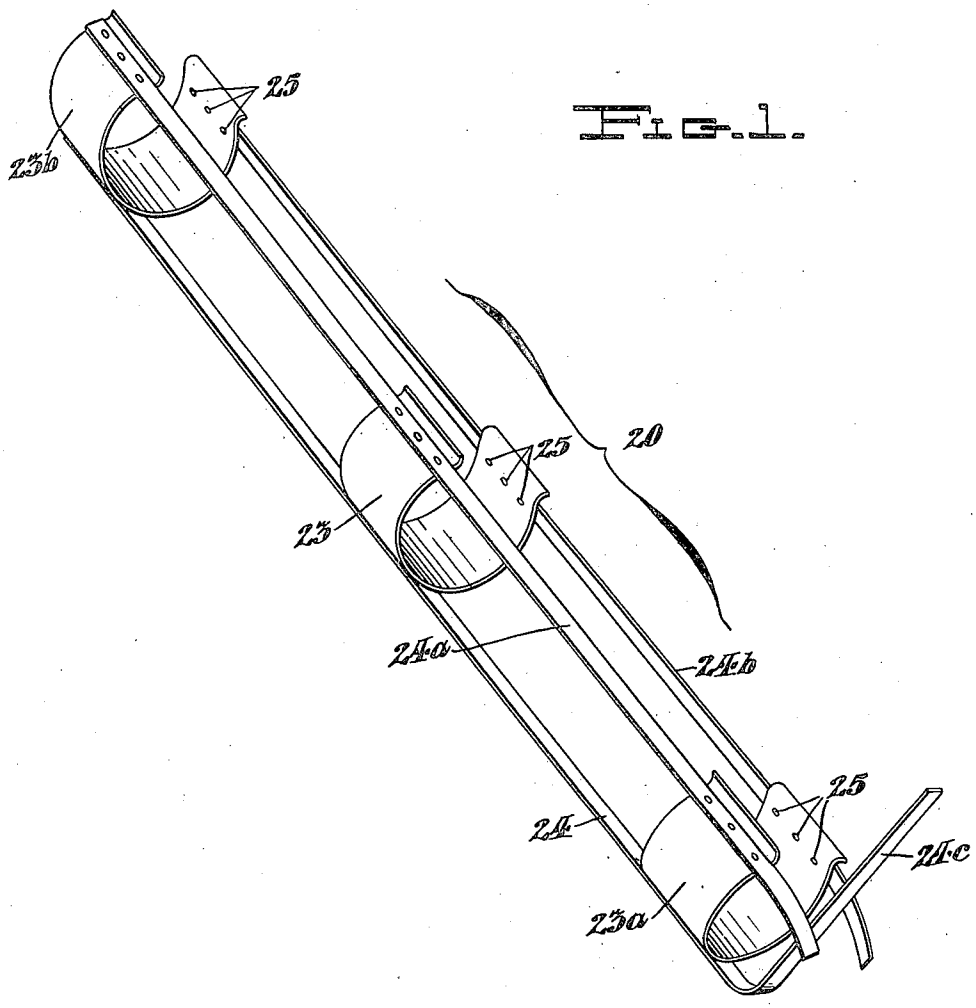
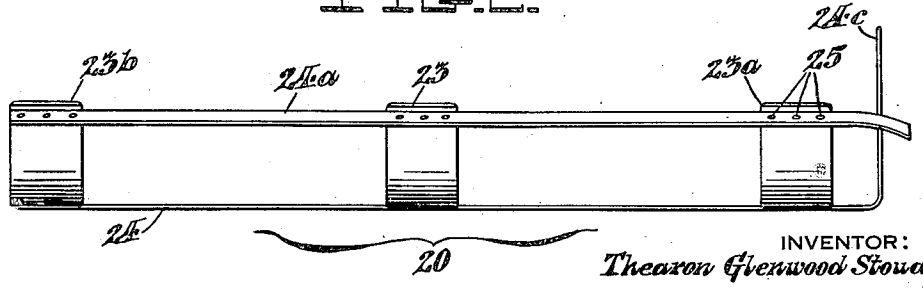


Fig. 2.



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FIG. 3.

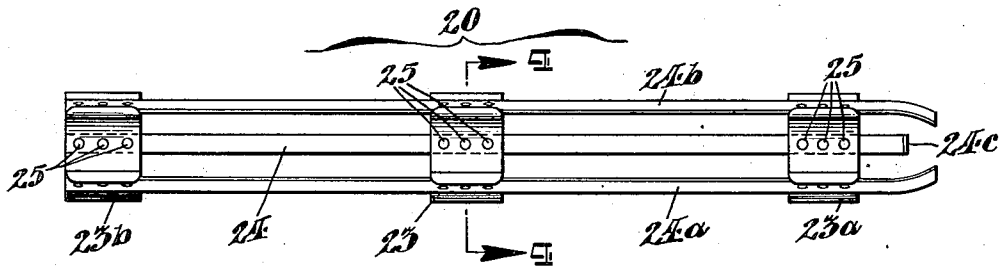


FIG. 5.

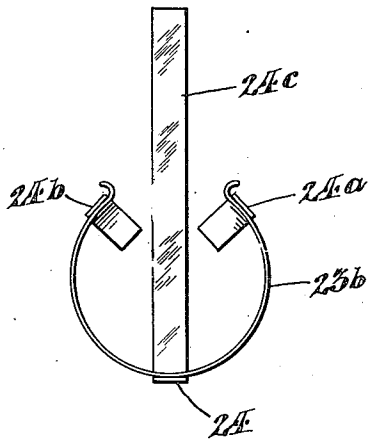


FIG. 6.

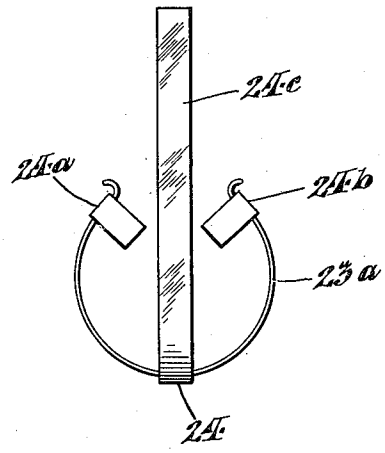
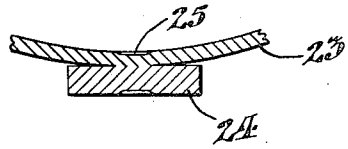


FIG. 9.



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Fig. 7.

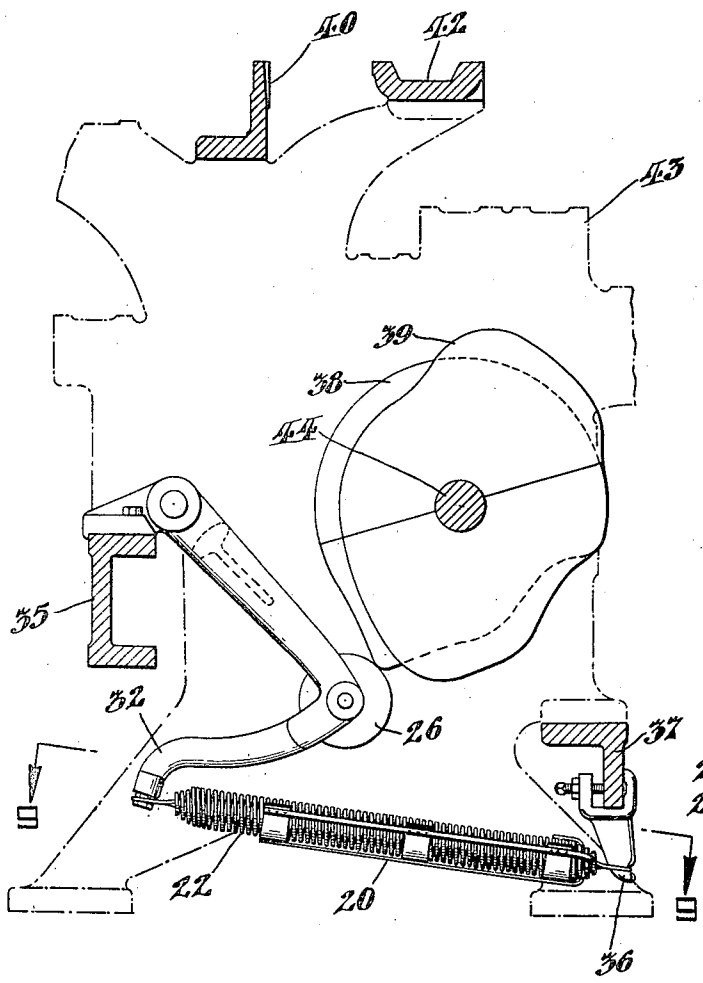


Fig. 8.

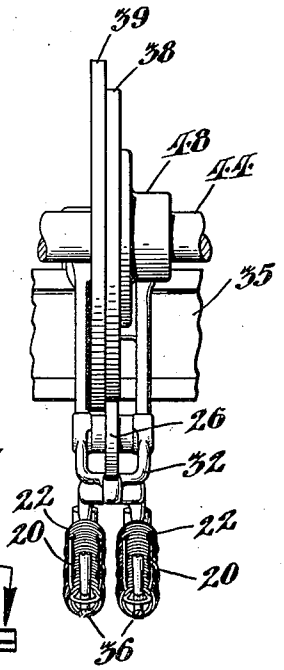
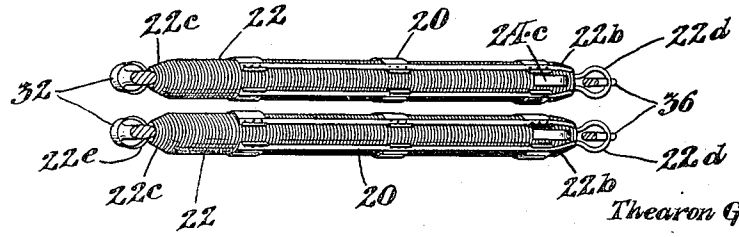


Fig. 9.



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Fig. 10.

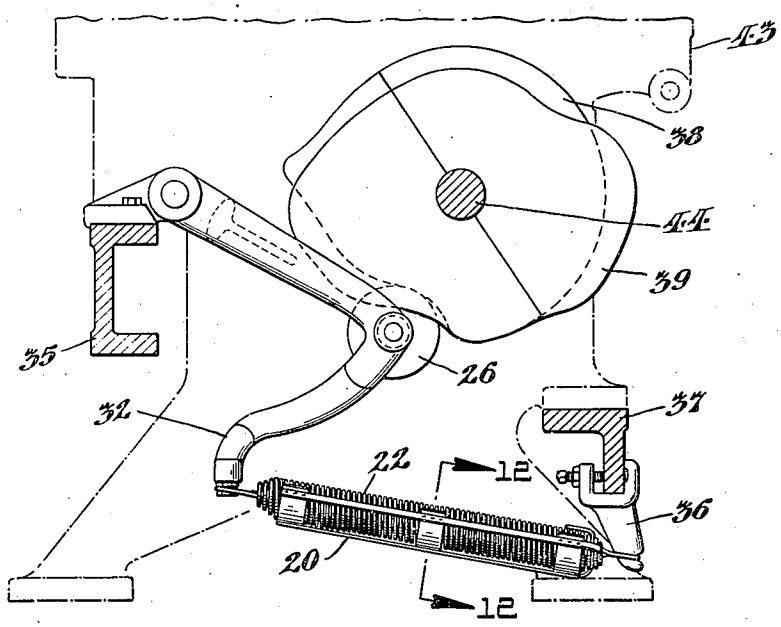


Fig. 11.

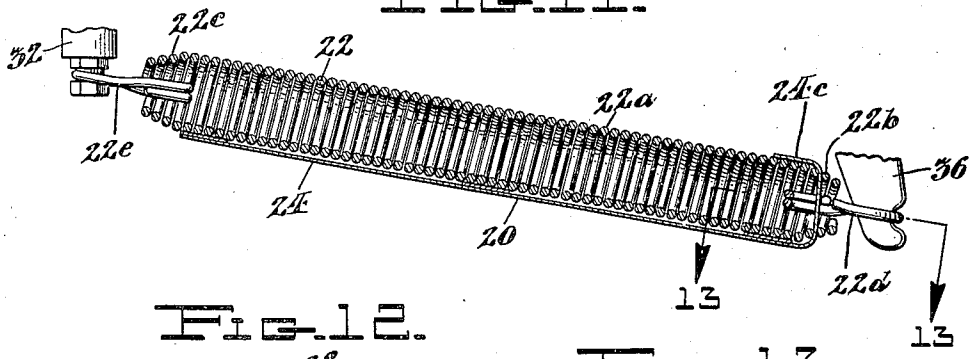


Fig. 12.

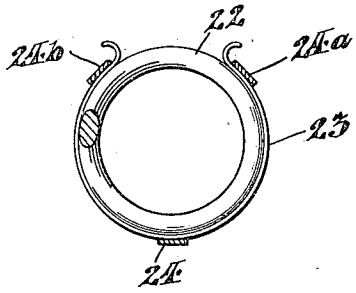
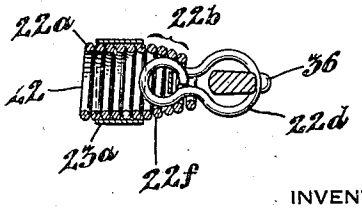


Fig. 13.



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UNITED STATES PATENT OFFICE

2,370,111

COIL SPRING APPLIANCE

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Application December 26, 1941, Serial No. 424,550

17 Claims. (Cl. 267—1)

This invention relates to means associated with coil springs operated at comparatively high speeds, to prevent detrimental vibratory action thereof when in use.

It is well known that under certain conditions, high speed operation of coil springs will set up detrimental vibratory or surging action in the same. Among other things, such action induces noisy operation, varies the tension of the springs, reduces the operating efficiency of the mechanism associated with the springs, and gives rise to forces which effect premature fatigue, and breakage, of the springs. Difficulties of this nature are experienced with certain high speed springs used on full-fashioned and other knitting machines, for example, the springs of a full-fashioned knitting machine which function to maintain cam follower rollers in contact with cams rotated at a speed of about seventy-five or more revolutions per minute. It has been found that devices heretofore available to overcome the said difficulties, are either not adaptable for use with such knitting machine springs, or unsatisfactory when used in conjunction therewith.

It is an object of my invention to provide a novel device, or appliance, for overcoming the mentioned and other difficulties in connection with coil springs in general, and particularly those used on knitting machines and the like.

Another object is to provide such a device which will not seriously interfere with the spring, when operating either at low or high speed.

A further object is to provide such a device which is capable of progressively obstructing, subduing, or dampening, the surging tendency of a spring being operated at high speed, to such an extent that the spring operation is substantially normal, or similar to that of a spring being operated at low speed.

An additional object is to provide such a device having elements which do not contact the coils of the spring when the latter is at rest, or operating at low speed, and which function to limit lateral movement of the coils incident to spring operation at relatively high speed.

A further object is to provide such a device which is particularly adapted for association with certain types of springs on flat, or full-fashioned, knitting machines.

Among other objects are, to provide such a device for a coil spring operated at high speed, which may be quickly and easily applied to, and removed from, the spring; which is simple in construction, comparatively light in weight, and inexpensive to manufacture; which when applied to a horizontally positioned spring braces the latter against sagging; which engages the spring in such manner that there is a minimum of friction between the device and the spring when the latter is in operation; and which has the desirable features and advantages over prior art devices apparent from the detailed disclosure of the invention, as hereinafter set forth.

With these and other objects in view, which will become apparent from the following detailed description of the illustrative embodiment of the invention shown in the accompanying drawings, my invention resides in the novel device comprising the new elements, features of construction and arrangement of parts in cooperative relationship as hereinafter more particularly pointed out in the claims.

In the drawings:

Figure 1 is a perspective view of the device of my invention;

Fig. 2 is a side view of the device shown in Fig. 1 but on a reduced scale;

Fig. 3 is a top view of the device as shown in Fig. 2;

Fig. 4 is an enlarged fragmentary sectional view, taken substantially along line 4—4 of Fig. 3;

Fig. 5 is an enlarged left end view of the device as shown in Fig. 3;

Fig. 6 is an enlarged right end view of the device shown in Fig. 3;

Fig. 7 is a sectional view of a full-fashioned knitting machine with certain parts omitted, to more clearly show the application of my invention;

Fig. 8 is a front view of certain parts of the mechanism shown in Fig. 7;

Fig. 9 is a sectional view taken substantially along line 9—9 of Fig. 7;

Fig. 10 is a view similar to Fig. 7, showing the parts in different operative positions;

Fig. 11 is a detail sectional view of certain parts of the mechanism of Fig. 10;

Fig. 12 is an enlarged sectional view, taken substantially along line 12—12 of Fig. 10; and

Fig. 13 is a sectional view taken substantially along line 13—13 of Fig. 11.

In the drawings and description my invention is exemplified in association with the spring of a full-fashioned knitting machine of which only the means necessary to a complete understanding of the invention have been specifically set forth; further information as to the construction and operation of other related, usual and well known

knitting elements, mechanisms, etc., may be found in one or more of the following publications:

1. Pamphlet entitled—Full-Fashioned Knitting Machines—published and copyrighted by the Textile Machine Works, Reading, Pennsylvania, in 1920.

2. Three catalogs entiled—The "Reading" Full-Fashioned Knitting Machine Parts Catalog—published and copyrighted by the Textile Machine Works, in 1929, 1935 and 1940, respectively.

3. Booklet entitled—The "Reading" High Production Full-Fashioned Knitting Machine—which forms a supplement to the above noted 1940 parts catalog of the Textile Machine Works, and which booklet is a publication of the Textile Machine Works, and was copyrighted by the latter in 1940.

4. Pamphlet entitled—Knitting Machine Lectures—published by the Wyomissing Polytechnic Institute, Wyomissing, Pennsylvania, in 1935.

In practice, the device or appliance **20** of my invention, may be associated with the coil spring **22** of a machine used for knitting full-fashioned stockings, as illustrated in the drawings. Such a spring generally comprises a cylindrical main body portion **22***a* composed of coils of uniform diameter, and end portions **22***b* and **22***c*, one of which is secured to a stationary part **36** and the other to a movable part **32**, of the machine, by connector elements **22***d* and **22***e*, ordinarily associated with the spring. The tapering end portions **22***b* and **22***c* consist of coils of progressively reduced diameters, as shown in Figs. 11 and 13.

In springs of this kind, it has been found that at high speed operation, detrimental surging actions, or vibrations, originate at the movable end **22***c*, which move lengthwise of the spring toward the stationary end **22***b* thereof. These vibrations abruptly terminate upon arriving at the coil **22***f* of the end portion **22***b*, in contact with said connector part **22***d*. This action induces abnormal twisting of certain coils, with consequent premature fatigue and breakage of the spring, at one point or another.

The device **20** comprises a series of substantially C-section sleeve-like spring clip members, or collars, **23**, **23***a* and **23***b*, held in spaced and aligned relationship with each other by connecting bars **24**, **24***a* and **24***b* secured thereto at **25**, as by welding, soldering, riveting or other well known and practical means. The spaced members **23**, **23***a* and **23***b* are preferably of thin sheet material, such as resilient metal, arranged to be sprung around the knitting machine coil spring **22**, having an outside diameter slightly larger than the inside diameter of said members, and surrounding more than 180° but less than 360° of the perimeter of the spring. Members **23**, **23***a* and **23***b* are, therefore, adapted to snugly engage the spring **22**, in the manner illustrated in Fig. 12, without, however, preventing longitudinal movement of the coils thereof relative to the members. The connecting bars **24**, **24***a* and **24***b* are spaced from the spring (Fig. 11) a distance equal substantially to the thickness of the metal from which the members **23**, **23***a* and **23***b* are formed, so that no friction can exist between the bars and spring during slow speed operation of the latter. Obviously, this spacing may be varied, as desired, by varying the thickness of the spacer means. The device **20** is anchored against axial displacement relative to the substantially inactive part **22***b* of the spring **22**, by means of a free end extension **24***c*, illustrated in Figs. 1, 2, 5 and 6, which is inserted between adjacent coils of the end portion **22***b* and bent over to rest upon the spring, see Fig. 11. In addition, the free ends of the side bars **24***a* and **24***b* are shaped to rest against the end **22***b* of the spring to further assist in maintaining the device in anchored position on the spring.

It will be apparent from reference to Figs. 7 and 10, that the device **20** extends over substantially the entire length of the spring **22**, when the latter is contracted. When the spring is tensioned, as when the cam follower **26** is on a high point of the cam **38**, the length of the spring **22** is increased and extends beyond the device **20**. However, since the detrimental vibrations, or surging action of the spring **22**, is at a maximum when the spring is contracted and therefore practically entirely within the device **20**, the latter is effective along substantially the entire length of the spring during the critical phase of the spring vibration cycle.

I have found that when the spring **22** is operated at high speed, by itself and without the device **20**, the vibratory or surging action is particularly noticeable when the follower is on the inactive part of the cam **38**, however, when the device **20** is applied to the spring this action is progressively obstructed or subdued by the members **23**, **23***a* and **23***b*, to a point eliminating all detrimental effect on the spring. In this connection the bars **24**, **24***a* and **24***b* function to maintain the lateral vibrations of the spring confined within the limits determined by the spacing of the bars from the spring, and also effect a substantially rigid structure which braces the spring against sagging, when in horizontal position.

The movement of the spring **22** in the device **20** causes the collars **23**, **23***a* and **23***b* to have a restraining action on those portions of the spring with which the collars slidingly cooperate. The extent of this restraining action depends upon the amount of elongation of the spring **22**, as determined by the contour of the operating cam **38**. It will be understood, therefore, that the surge dampening or vibration reducing effect is progressive, because the collars **23**, **23***a* and **23***b* are arranged so that the sliding cooperation of each collar with the spring varies in extent. The collar **23***b* being located near the active end of spring **22**, where the surging action originates, obviously exerts the greatest surge restraining influence. The minor impulses passing beyond collar **23***b*, are further reduced by the collar **23**, and are entirely stopped when reaching collar **23***a*.

In order that the construction and purpose of the springs **22** may be fully understood, it is pointed out that these springs are approximately sixteen inches long, one and three-fourths inches in diameter (middle section) and are formed of wire approximately one-fourth of an inch in diameter. They are cooperatively associated with the well known balancing cam mechanism of the full-fashioned knitting machine of the "Reading" type illustrated, to maintain a cam roller **26** in operative engagement with balancing cams **38** and **39**.

The illustrated parts of the knitting machine comprise beams **35** and **37**, center bed **40** and front bed or table **42** which are arranged in parallel relationship lengthwise of the machine, and cooperate with upright frames **43** to effect a rigid frame structure on which the various mechanisms of the machine are supported. A camshaft **44** extends lengthwise of the machine

in parallel relationship to the aforesaid beds and beams, and is rotatably mounted in bearings (not shown) secured to the frames **43**. A series of cams including balancing cams **38** and **39** are mounted on the camshaft **44**, as by cam flanges **48** which are fastened to the camshaft in well known manner. The regular knitting mechanism balancing cam **38** and the narrowing mechanism balancing cam **39** are arranged in juxtaposed relationship on the camshaft **44**. Cam **38** cooperates with the cam roller **26** when the camshaft **44** is in its normal position, as shown in Fig. 8, whereas the narrowing cam **39** engages the roller **26** when the camshaft **44** is shifted axially a distance of one cam width to the right from the position shown in Fig. 8 to its so-called narrowing position.

Of course, the novel device shown and described, by which I obtain the referred to advantageous results, can be changed and modified in various ways without departing from the invention herein disclosed and hereinafter claimed.

I claim:

1. A device of the character described comprising a plurality of axially spaced substantially cylindrical members arranged for sliding association in use with the outside of a coil spring of a knitting machine and having their central transverse planes substantially at right angles to the axis of the spring, means for securing said device to said spring, and means for securing said members in longitudinally spaced relationship along said spring.

2. A device of the character described, comprising a plurality of substantially cylindrical members arranged for sliding association with the coil spring of a knitting machine, and a plurality of connector bars arranged to maintain said members in axially spaced relationship along said spring.

3. A device of the character described, comprising a plurality of sleeve-like members arranged for sliding association with the coil spring of a knitting machine, a plurality of connector bars secured to the periphery of said members, and an extension on one of said bars arranged for connection with the spring.

4. A device of the character described comprising a plurality of sleeve-like members arranged for sliding association with a coil spring, and means arranged to maintain the members in spaced relationship on the spring, said means being spaced from the spring and functioning to stop lateral spring vibrations which reach a magnitude defined by the space between the spring and said means.

5. A device of the character described comprising a plurality of resilient clamping collars arranged for sliding association with a coil spring, a rod-like element to which said clamping collars are fastened in spaced relationship, and means arranged to anchor said device to said spring.

6. A device of the character described comprising a plurality of resilient vibration subduing members arranged for sliding association with a coil spring, and a longitudinally extending connector to which said mounting members are secured in spaced relationship, said connector having a portion thereof arranged to anchor the device to said coil spring.

7. A device of the character described comprising a plurality of clamping collars for detachably securing the device to the spring, a plurality of longitudinal connector members arranged in spaced parallel relationship circumferentially of the spring and to which said clamping collars are rigidly secured at spaced intervals, one of said connector members having a portion thereof arranged to cooperate with said spring to prevent longitudinal displacement of the device relative to said spring.

8. A device of the character described comprising a plurality of clamping collars for attachment circumferentially of the spring at spaced intervals longitudinally thereof, a plurality of longitudinal connector members normally spaced from said spring and arranged in spaced parallel relationship circumferentially of the spring and to which said clamping collars are rigidly secured, one of said connector members having a portion thereof shaped to conform with the contour of an end portion of said spring, and another of said connector members having a portion anchored to the spring to prevent longitudinal displacement of said device.

9. A coil spring appliance comprising a plurality of axially spaced cylindrical collar members of thin metal arranged to be sprung around a coil spring having an outside diameter larger than the inside diameter of the members and having their central transverse planes substantially at right angles to the axis of the spring when in use, the appliance engaged solely by the spring in use, means for effecting sliding cooperation in use between the spring and said members and means for holding the collar members to the spring.

10. A coil spring appliance comprising a plurality of axially spaced cylindrical collar members of thin metal arranged to be sprung around a coil having an outside diameter larger than the inside diameter of said members and having their central transverse planes substantially at right angles to the axis of the spring, means for maintaining said members in sliding coaction with the spring in use, and means for anchoring the appliance to one end of the spring.

11. The combination with a coil spring and means for effecting high frequency operation thereof, of an appliance supported entirely on the spring comprising a plurality of generally cylindrical light metallic collar members surrounding more than 180° but less than 360° of arc of said spring and slidable thereon, and metallic spacer means connecting said members and maintaining them a fixed distance apart.

12. The combination with a coil spring and means for effecting high frequency operation of the latter of means entirely on the spring for suppressing detrimental vibrations of said spring comprising a resilient generally cylindrical collar extending over more than 180 degrees but less than 360 degrees of arc and adapted to be sprung onto said spring by a movement transverse to the axis of the spring but slidable relatively to the coils of the spring when the spring elongates and contracts and having a part fixed thereto for attaching the collar to the spring.

13. The combination with a coil spring and means for effecting high frequency operation of the latter of a plurality of resilient generally cylindrical light metallic collars of more than 180° but less than 360° adapted and arranged to be sprung over the spring by a movement transverse to the axis of the spring, and spacing means connecting said collars and having a portion for anchoring said collars against movement longitudinally of the spring.

14. A device for damping vibrations in coil

springs comprising a resilient generally cylindrical light metallic collar member extending more than 180° and less than 360° of arc adapted to be sprung around a spring by a movement transverse to the axis of the spring, the edges of the gap in the collar being bent outward to facilitate springing the device in place, and a member fixed to said collar and adapted to engage the spring to anchor the device to the spring.

15. In a combination with a coil spring of a device for suppressing deleterious vibrations of the spring, comprising one or more resilient collars adapted to be snapped onto the spring by a movement transverse to the spring and having sliding relation with the coils of the spring in use, and a part associated with one of said collars and arranged to pass between turns of the spring for determining the position thereof.

16. In a combination of a coil spring and a device for suppressing deleterious vibrations of the spring, the improvement comprising a collar adapted to be snapped onto the spring by a movement transverse to the spring and having sliding relation to the coils of the spring in use, and a part connected to said collar arranged to pass between coils of the spring at the time of said transverse movement and to be bent to hold the collar from movement lengthwise on the spring.

17. In a combination of a coil spring capable of developing deleterious vibrations in use, means for effecting high frequency operation thereof and a device for suppressing said vibrations, the improvement comprising a collar extending over more than 180 degrees of arc and less than 360 degrees of arc, said collar surrounding and entirely supported on the outer surface of the spring and having sliding relation to the coils of the spring in use, and means engaging only the coils of the spring for holding said collar in position longitudinally of the spring.

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