Dec. 5, 1967 J. J. BOND 3,356,359

PRESTRESSED FURNITURE SPRING

Original Filed Sept. 28, 1964 2 Sheets-Sheet 1

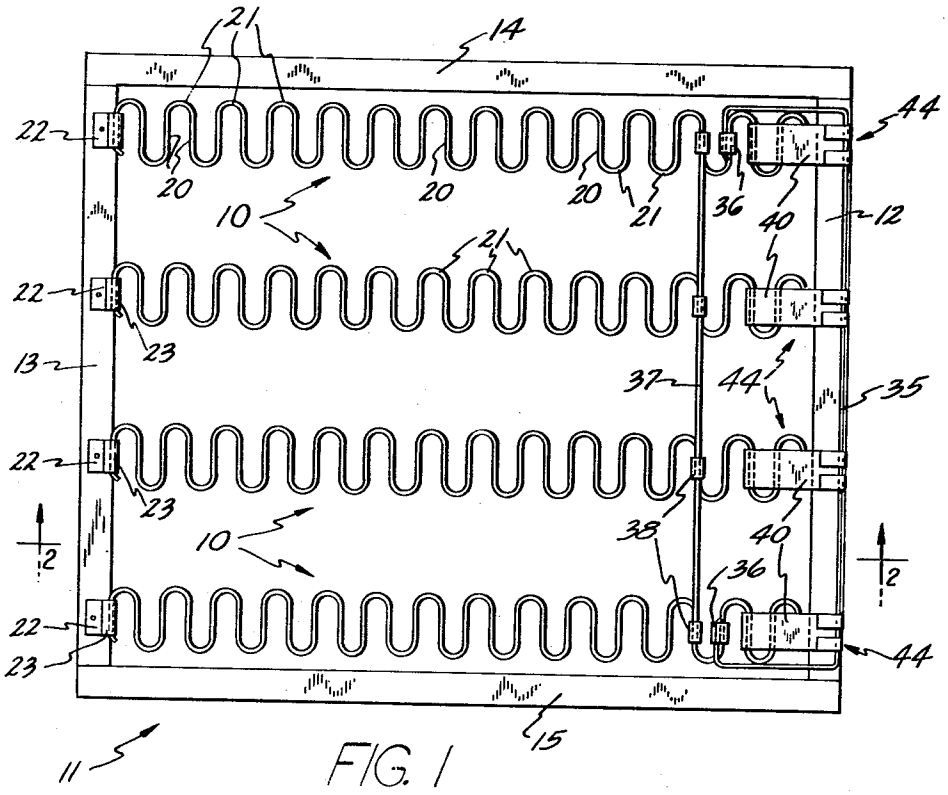


FIG. 1

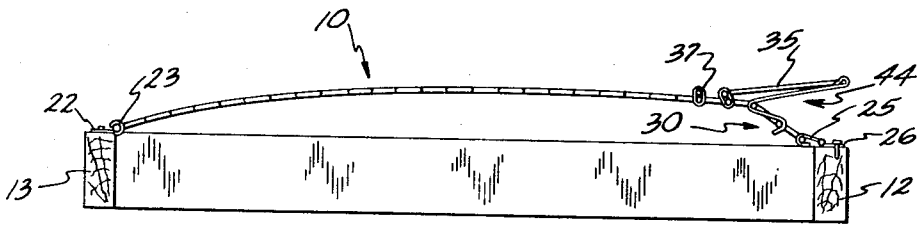


FIG. 2

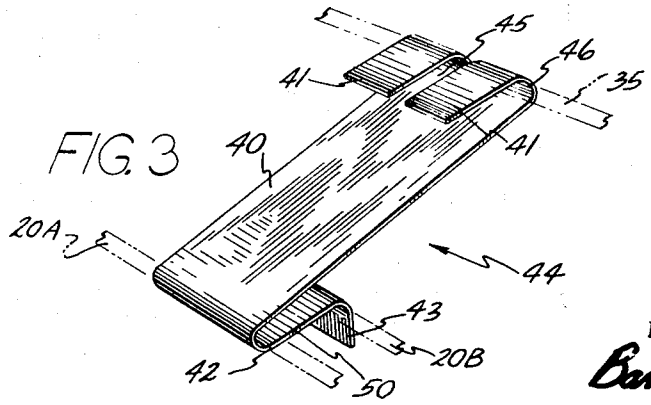


FIG. 3

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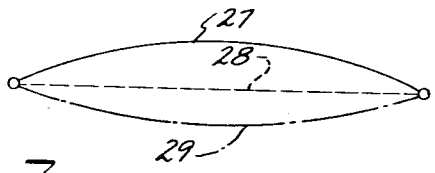


FIG. 7

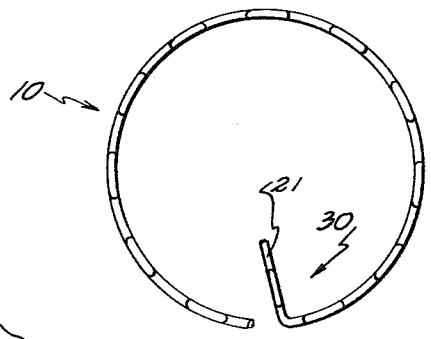


FIG. 4

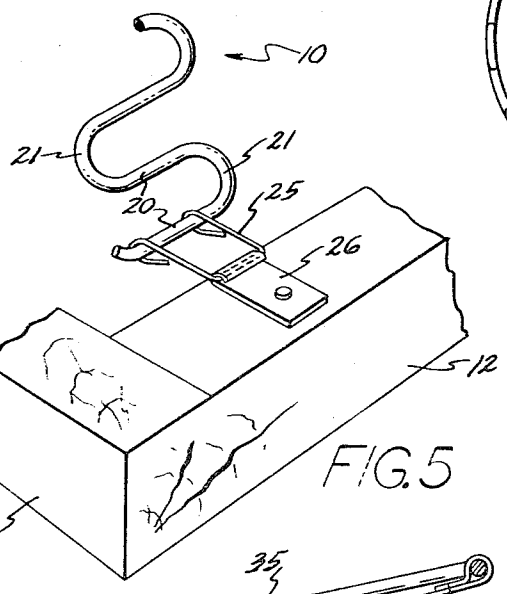


FIG. 5

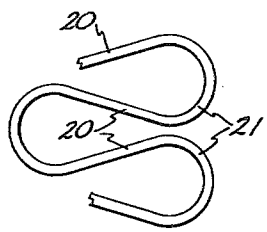


FIG. 8

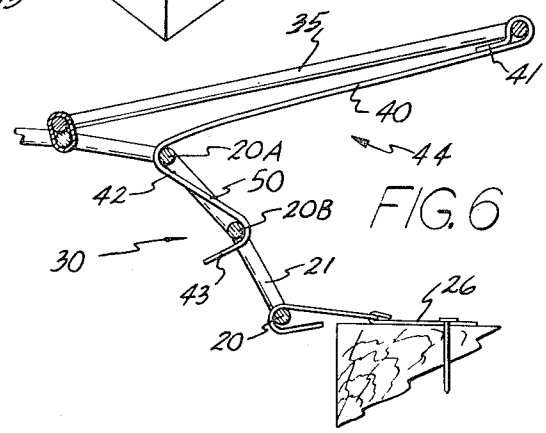


FIG. 6

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3,356,359
PRESTRESSED FURNITURE SPRING

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Continuation of application Ser. No. 399,700, Sept. 28, 1964. This application May 23, 1967, Ser. No. 640,627
15 Claims. (Cl. 267—102)

ABSTRACT OF THE DISCLOSURE

A spring assembly including a sinuous spring extending across a furniture frame and including an angularly offset portion defining an integral prestress lever. And an auxiliary spring to be disposed in engagement with any sinuous spring but providing particular advantages when attached to the integral prestress lever portion for reinforcing same.

This application is a continuation of copending application Ser. No. 399,700, filed Sept. 28, 1964, and assigned to the assignee of the instant invention.

This invention relates generally to an improved prestressed spring arrangement for furniture and more particularly to an integral sinuous spring structure that is shaped to produce the prestress forces when it is assembled to the furniture frame without the aid of separate appliances.

Patent No. 2,958,375 issued on Nov. 1, 1960, describes the advantages of prestressing sinuous springs in furniture applications from an arcuate configuration when the spring is relaxed, to a substantially rectilinear shape when the prestress forces are applied. The patent discloses a prestress lever that is arranged to be mounted in the furniture spring assembly to apply a force that serves to prestress the pring from its relaxed arcuate position to a prestressed flattened or rectilinear position.

It is a general object of the present invention to provide an improved sinuous furniture spring that may be prestressed in the spring assembly without the use of extraneous levers for producing the prestress forces.

Another object is to provide a sinuous furniture spring with a prestress lever incorporated as an integral part of the spring.

Another object of the present invention is to provide a reinforcing structure for attachment to the spring at the point where the prestress forces are applied to prevent these forces from straining the spring beyond its elastic limits.

Another object is to provide auxiliary springs to supplement the sinuous springs of a furniture spring assembly with an auxiliary spring being mounted on each sinuous spring in a manner to reinforce the sinuous spring for preventing the prestress forces from straining the spring beyond its elastic limits.

A further object is to provide a sinuous furniture spring assembly of simple and inexpensive construction that is sturdy and efficient in operation.

According to this invention the improved sinuous spring construction provides for shaping either both or one end of each length of sinuous spring so that the end departs from the normal path of the spring when the latter is in the relaxed condition. Such distorted end constitutes an integral prestress lever that serves to apply a prestress force to the spring when the latter is assembled to the furniture frame to cause the spring to be flattened from its relaxed arcuate position into a prestressed rectilinear position that possesses the ideal characteristics for a furniture spring. However, the prestress forces applied to the spring produce an excessive strain at the end of the spring where the integral prestress lever is formed and

such strain would tend to distort the conventional spring beyond its elastic limits which would result in a permanent set of the spring.

In order to alleviate this prestress strain on the sinuous springs, the auxiliary springs that normally supplement the sinuous springs are clipped onto the sinuous springs in such a manner as to reinforce the sinuous springs at the point where the excessive strains will occur. Such reinforcement enables the sinuous springs to withstand the prestress forces and renders it possible to incorporate the prestress lever integrally with the sinuous springs.

The foregoing and other objects of the invention, which will become more fully apparent from the following detailed description, may be achieved by means of the apparatus described in connection with the accompanying drawings in which:

FIGURE 1 is a plan view of a sinuous spring assembly for a chair which is mounted on a frame and incorporates the present invention;

FIGURE 2 is a view in vertical section taken along the plane represented by the line 2—2 in FIGURE 1;

FIGURE 3 is a perspective detail view of the auxiliary spring that is especially adapted to complement the sinuous spring which incorporates the integral prestress lever construction of the present invention;

FIGURE 4 is a side elevational view of a sinuous spring incorporating the integral prestress lever of the present invention with the spring being depicted in the relaxed condition;

FIGURE 5 is an enlarged fragmentary perspective view showing the end of a sinuous spring attached to the furniture frame;

FIGURE 6 is an enlarged fragmentary view partly in vertical section and partly in side elevation illustrating the auxiliary spring that is shown assembled to the sinuous spring in FIGURE 3;

FIGURE 7 is a diagrammatic view illustrating several possible positions of the sinuous spring when mounted in a furniture spring assembly; and

FIGURE 8 is a diagrammatic view of a portion of a sinuous spring compressed together by a load.

Reference is now made more particularly to the drawings and specifically to FIGURE 1 thereof which illustrates a sinuous spring assembly for the seat of a chair. The assembly includes four sinuous springs **10** mounted on a chair frame generally identified by the reference numeral **11**. The chair frame comprises a front member **12** and a back member **13** that are secured between two side members **14** and **15** to form the rectangular frame **11** upon which the sinuous springs **10** are mounted to constitute the frame and spring assembly for the seat of a chair.

The sinuous springs **10** are formed from a length of spring wire formed to follow a sinuous path as best shown in FIGURE 1. As a result, each of the springs comprises a plurality of parallel reaches **20** that are joined to each other by semi-circular portions **21**. Thus, each of the reaches **20** is joined to the preceding parallel reach **20** by a semi-circular portion **21** on one side of the spring **10** and to the succeeding reach **20** by another semi-circular portion **21** on the opposite side of the spring **10**.

When the springs **10** are relaxed they assume an arcuate configuration, preferably of substantially circular form as illustrating in FIGURE 4. When applied to the furniture frame, they are stressed out of their relaxed condition into a position to stretch across the frame **11** with one end of each of the springs being attached to the back frame member **13** and the opposite end being coupled to the front frame member **12** as depicted in FIGURES 1 and 2. To this end, a plurality of clips **22** are fixed to the top edge of the frame member **13** with one clip **22** being provided for each of the springs **10**. The specific spring assembly

illustrated in the drawings provides four springs **10** so that four clips **22** are fixed to the frame member **13**. Each of the clips **22** is provided with a tubular portion **23** for receiving the end of its associated sinuous spring **10**. The extremity of the spring extends beyond the tubular portion **23** and is bent slightly to secure the spring to the clip **22** as clearly illustrated in FIGURE 1.

As best shown in FIGURES 2 and 5, the opposite end of each of the springs **10** is coupled to the frame member **12** by a wire clip **25** that is pivotally supported by a bracket **26** which is fixed to the frame member **12**. The pivotal mounting of the clip **25** permits a slight yielding movement which is desirable at the forward end of the springs **10**. If a stiffer mounting is desired the clip **25** may be omitted and the end of the spring **10** attached directly to the bracket **26** or otherwise fastened to the frame member **12** in well known manner.

In the past it was the accepted practice to mount both ends of the spring **10** to the frame members in the same manner as the rear ends of the springs **10** are shown mounted to the back member **13** of the frame **11** in FIGURES 1 and 2. This resulted in the springs **10** following a pronounced arcuate path as represented by the solid line **27** in FIGURE 7. When a load is placed upon a spring that is supported in this arcuate position, the arc of the spring is flattened and when it reaches the substantially horizontal position represented by the dotted line **28** in FIGURE 7, the reaches **20** not only respond to torque by rotation about the longitudinal axis of each reach, but also, since the arc is being flattened and the length of the band is shortened, the respective reaches will no longer be parallel with one another, but rather, will diverge toward each other to the position depicted in FIGURE 8. As this occurs, a maximum amount of compressive stress is placed upon the semi-circular portions **21** of the spring, and as the latter moves on down into the position represented by the broken lines **29** in FIGURE 7, the spring action of the semi-circular portions **11** is relieved to permit the spring to elongate to accommodate the position represented by the broken line **29** in FIGURE 7. As a result, the flexing of the spring **10** from the position represented by the broken line **29** involves a continual increase in the torsional stresses upon each of the reaches **20**, but the torsional strength of the reaches **20** is not only overcome by the load applied to the spring but also by the opposing spring action and the relieving of stresses in the semi-circular portions **21** of the spring. Accordingly, after the load on the seat has forced the spring **10** past the horizontal arc represented by the dotted line **28** in FIGURE 7, the forces developed by the spring itself act to move the spring beyond the horizontal position so that the spring reacts to the load to a much greater extent after the spring has passed the horizontal position. Because of this characteristic the capacity of the spring is reduced substantially.

This undesirable characteristic of sinuous furniture springs was first overcome by a prestress lever disclosed in said Patent No. 2,958,375 issued on Nov. 1, 1960. The prestress lever described in that patent prestresses the sinuous spring to the rectilinear horizontal position represented by the dotted line **28** in FIGURE 7 with the reaches parallel to each other to thereby avoid the compression of the reaches **20** to the position shown in FIGURE 8. Instead, when a load is applied to a sinuous spring that is prestressed to the horizontal position, the parallel reaches **10** diverge relative to each other and therefore full advantage is taken of the torsional strength of the reaches **20** throughout the limits of the spring movement. As a result, a substantially uniform displacement of the sinuous spring **10** occurs per unit of load applied which is a desirable characteristic in a furniture spring. The only disadvantage of such prestressed spring arrangement lies in the fact that a separate prestress lever was required for each sinuous spring in the assembly, and if a fully rectilinear position was desired a prestress lever was required for each end of the spring. The present invention overcomes this disadvantage by incorporating the prestress lever as an integral part of the spring **10** to obtain the same characteristics that were previously produced through the use of the prestress levers disclosed in said patent.

The integral prestress lever is produced in the sinuous spring **10** by the simple expedient of forming the spring so that when it is in the relaxed position shown in FIGURE 4 either one or both ends of the spring are displaced from the relaxed path of the other portion of the spring so that the displaced portion constitutes the prestress lever. Although other proportions and angles may be provided to accommodate the particular spring structure and its specific characteristics, the illustrated embodiment shows a prestress lever **30** formed at only one end of the spring **10** and it is formed by bending a portion of the spring **10** to displace the last two semicircular portions **21** and their associated reaches **20**. This end portion of the spring **10** is displaced so that it extends inwardly from the circular path of the spring **10** to a position approximately 15° from the radius of the circle when the spring **10** is in its relaxed position. The mounting of the spring **10** on the frame **11** causes the prestress lever **30** to apply a stress to the spring which forces it from the arcuate position represented by the solid line **27** in FIGURE 7 to the horizontal position as depicted in FIGURE 2 and represented by the horizontal line **28** in FIGURE 7. Since the prestress lever **30** is applied to only the forward portions of the springs **10** in the illustrated embodiment, approximately the forward two-thirds of the springs assume the horizontal position. The absence of the prestress lever **30** at the rear portion of the springs permits the rear one third of the springs to follow the more arcuate path depicted in FIGURE 2. It should be understood that the prestress lever **30** may be applied to both ends of the spring **10** to cause the entire length of the spring **10** to follow a rectilinear path and the arcuate configuration of the back one third of the springs as illustrated in FIGURE 2 will be eliminated. However, in most chair construction the arcuate configuration of the rear portion of the spring is not particularly detrimental and it is depicted in the illustrated embodiment for the purpose of more clearly illustrating the affect that the integral prestress lever **30** has on the spring. Thus, the illustrations show the effect of the prestress lever **30** at the front end of the spring and the rear portion of the spring represents its portion when the prestress lever **30** is omitted.

As best shown in FIGURE 2, the integral prestress lever **30** extends upwardly from the front member **12** at an angle of approximately 45° toward the rear member **13** of the frame **11**. From the top of the prestress lever **30** the sinuous spring **10** extends substantially horizontally until it begins to arc downwardly through approximately the last one third of its length into engagement with the back member **13**. This arrangement of the prestress lever **30** leaves a gap from the forward surface of the front member **12** to the top of the prestress lever **30**. In order to extend the horizontal surface of the spring assembly to the forward surface of the front member **12** and overlie the gap at the forward portion of the frame **11** to provide a proper support for upholstery, a wire frame **35** is attached to one of the reaches **20** of the sinuous springs **10** by clips **36** in well known manner. The wire frame **35** extends from its point of attachment with the sinuous springs **10** forwardly to extend approximately to the plane of the forward surface of the front member **12** as depicted in FIGURE 2. The forwardly extending wire member of the frame **35** is supported by four auxiliary springs generally identified by the reference numeral **44**, one of which is provided for each of the sinuous springs **10**. In addition, a rod **37** extends across the spring assembly and is fastened to each of the springs **10** by a clip **38**. The rod **37** serves to tie the several springs together so that they function cooperatively and are not displaced excessively relative to each other.

As best shown in FIGURE 3, the auxiliary spring **44** comprises a flat sheet metal body **40** that has one end split by a kerf **45** to form a pair of leaves **41** that are bent backwardly to overlap the body **40**. The overlapping leaves **41** constitute clips formed integrally with the auxiliary spring **44** for attaching the forward end of the latter to the front wire of the frame **35**. The overlapping leaves **41** are shown in their open position in FIGURE 3 spaced from the body portion **40** to furnish an access for the passage of the wire of the frame **35** into a crook **46** formed by the bending of the leaves **41** rearwardly over the body **40**. The wire of the frame **35** is depicted by broken lines in FIGURE 3 disposed within the crook **46**. The wire is secured in this position by the simple expedient of bending the leaves **41** downwardly about the wire and into engagement with the surface of the body **40** in the manner illustrated in FIGURE 6 where the auxiliary spring **44** is shown secured to the frame **35** by its integral clip formed by the overlapping leaves **41**.

The opposite end of the auxiliary spring **41** is attached to the sinuous spring **10** at the integral prestress lever **30** in the manner illustrated in FIGURES 3 and 6. It is attached to the prestress lever **30** by a hook **42** and a catch **43** that are integrally formed with the body **40** by bending the end of the body opposite the end on which the leaves **41** are formed. Thus, the rearward end of the body **40** is bent downwardly and toward the underside of the body to provide an underlying portion **50** which forms the hook **42**. The end of the underlying portion **50** is bent approximately 100° outwardly in a direction away from the body **40** to form the catch **43**.

As shown in FIGURE 6, the hook **42** is engaged about one of the reaches of the sinuous spring **10** and the reach that is engaged by the hook **42** is identified in FIGURES 3 and 6 by the reference numeral **20A**. The catch **43** is latched in the opposite direction about a reach **20B** to firmly secure the auxiliary spring **44** to the sinuous spring **10**. The mounting of the auxiliary spring **44** may be easily accomplished by passing the latch **43** between the two reaches **20A** and **20B** until the hook **42** engages the reach **20A**. The auxiliary spring **44** is then pivoted in a clockwise direction, as viewed in FIGURE 6, about the reach **20A** to engage the latch **43** about the reach **20B**. The frame **35** is then positioned to place its forward wire in the crook **46** and the leaves **41** are bent about the frame **35** and into engagement with the body **40** to secure the auxiliary spring **44** in position.

The auxiliary spring **44** is a well known expedient for overlying the gaps formed at the extremities of the sinuous spring construction and it supports the frame **35** in an upward position over the front member **12** to provide the proper base for upholstery that is applied about the frame **11** and over the springs **10**. However, in the present invention, the auxiliary spring **44** serves a further purpose of reinforcing the sinuous spring **10** for resisting the high forces that are developed by the integral prestress lever **30**. It will be noted from the view in FIGURE 6 that, as previously mentioned, the spring **10** is bent to displace the first two semi-circular portions **21** and their associated reaches **20** from the normal path followed by the configuration of the sinuous spring **10** when it is in the relaxed condition. The displaced portion forms the prestress lever **30**. When the spring **10** with its cooperating prestress lever **30** is applied to a furniture frame as shown in FIGURE 2, the force required to prestress the spring **10** into its rectilinear position is substantial and with the repeated flexing of the spring **10** when in use places a great strain on the semi-circular portion **21** that unites the two reaches **20A** and **20B** illustrated in FIGURE 6. This force has a tendency to distort the semicircular portion **21** beyond its elastic limits to cause the reaches **20A** and **20B** to diverge which would damage the spring and disturb its desirable characteristics. The hook **42** and the latch **43** of the auxiliary spring **44** are designed specifically for the purpose of not only attaching the auxiliary spring **44** to the sinuous spring **10**, but also to reinforce the spring by engaging the reaches **20A** and **20B** and retaining them in their parallel positions. Since the hook **42** and latch **43** retain the reaches **20A** and **20B** in their parallel positions they prevent the associated semicircular portion **21** from being distorted so that the proper sinuous configuration of the spring **10** is maintained throughout its length despite the large forces that are developed in the portion containing the integral prestress lever **30**.

Thus, a sinuous spring **10** formed of conventional gauge wire may be shaped to create a prestress lever **30** formed integrally with the spring to prestress the length of sinuous spring so that it occupies a rectilinear path when mounted to a furniture frame. Although the prestress forces plus the usual forces that occur during normal use may be beyond the capacity of the spring to withstand, the hook **42** and latch **43** of the auxiliary spring **44** cooperate with the spring to reinforce it at the point where the excessive forces are applied to assist the spring in withstanding them. As a result, the spring is at no time strained beyond its elastic limit.

From the foregoing detailed description of the construction and operation of the illustrative embodiment of the present invention it will become apparent that a new and improved sinuous spring construction has been provided in which a prestress lever is incorporated integrally with a sinuous furniture spring for improving the characteristics of the spring when the latter is mounted on a furniture frame by providing the proper prestress forces through the medium of the integral prestress lever. Moreover, the auxiliary spring which conventionally supplements the sinuous spring is constructed in a unique manner to reinforce the sinuous spring at the point where the excess prestress forces are developed to prevent damage to the spring.

Although the illustrative embodiment of the present invention has been described in considerable detail for the purpose of making a full disclosure of a practical operative arrangement by means of which the invention may be practiced, it is to be understood that various novel features of the invention may be incorporated in other arrangements without departing from the spirit and scope of the invention as defined in the subjoined claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In a spring assembly for mounting on a furniture frame; a sinuous spring shaped to have its length follow an arcuate path when said spring is in its relaxed condition, a prestress lever formed by a portion displaced from the relaxed path of the remainder of the spring, said prestress lever supported by the furniture frame and coupled to said sinuous spring, said prestress lever exerting a prestress force on said sinuous spring to flatten its arcuate configuration when said spring is mounted on the furniture frame to improve the characteristics of said spring for furniture applications; an auxiliary spring extending from said sinuous spring to provide a spring support at an extremity of the furniture frame; mounting means for mounting said auxiliary spring to said sinuous spring; and reinforcing means on said auxiliary spring in engagement with said prestress lever to reinforce said prestress lever to avoid damage to the spring by the prestress forces.

2. In a spring assembly for mounting on a furniture frame; a sinuous spring shaped to have its length follow an arcuate path when said spring is in its relaxed condition; a prestress lever formed by a portion displaced from the relaxed path of the remainder of the spring, said prestress lever formed integrally with said sinuous spring to prestress said spring and thereby flatten its arcuate configuration when said spring is mounted on the furniture frame to improve the characteristics of said spring; an auxiliary spring extending from said sinuous spring to provide a spring support at an extremity of the furniture frame; mounting means for mounting said auxiliary spring to said sinuous spring; and reinforcing means on said aux-

iliary spring in engagement with said prestress lever to reinforce the portion of said sinuous spring that is subjected to the maximum strain due to the forces developed by the action of said prestress lever.

3. In a spring assembly for mounting on a furniture frame; a sinuous spring comprising a plurality of parallel reaches disposed transverse to the length of said spring and connected to each other successively by semi-circular portions, said sinuous spring being shaped to have its length follow an arcuate path when said spring is in the relaxed condition; a prestress lever formed integrally with said sinuous spring and comprising the last several reaches at the end of the spring and their cooperating semicircular portions following a path that departs from the arcuate path of the relaxed spring; means for mounting said prestress lever to the furniture frame so that said prestress lever stresses the spring in a manner to cause the spring to flatten out from its arcuate path to improve its characteristics; a wire frame overlying said sinuous spring and extending outwardly therefrom to the extremity of the furniture frame; an auxiliary spring extending from said sinuous spring over said prestress lever to provide a spring support at the extremity of the furniture frame; means for securing said auxiliary spring to a plurality of said reaches of the spring; and a clip at the end of said auxiliary spring and formed integrally therewith for attaching said auxiliary spring to the extending portion of said wire frame.

4. In a spring assembly for mounting on a furniture frame; a sinuous spring comprising a plurality of parallel reaches disposed transverse to the length of said spring and connected to each other successively by semicircular portions; coupling means for coupling the ends of said sinuous spring to the furniture frame; a wire frame overlying said sinuous spring and extending outwardly therefrom to the extremity of the furniture frame; an auxiliary spring extending from said sinuous spring over said coupling means to provide a spring support at the extremity of the furniture frame; a hook on said auxiliary spring hooked over a first reach of said sinuous spring; a catch on one end of said auxiliary spring in engagement with a second reach of said sinuous spring to prevent said hook from being inadvertently displaced relative to said first reach and to thereby firmly secure said auxiliary spring to said sinuous spring; and a clip formed integrally on the opposite end of said auxiliary spring for clipping said auxiliary spring to said frame.

5. In a spring assembly for mounting on a furniture frame; a sinuous spring comprising a plurality of parallel reaches disposed transverse to the length of said spring and connected to each other successively by semicircular portions, said spring being shaped to have its length follow an arcuate path when said spring is in the relaxed condition; a prestress lever formed integrally with said sinuous spring and comprising the last several reaches at the end of the spring and their cooperating semicircular portions following a path that departs from the arcuate path of the relaxed spring; means for attaching said prestress lever to the furniture frame so that said prestress lever stresses the spring in a manner to cause the spring to flatten out from its arcuate path to improve its characteristics; an auxiliary spring extending from said sinuous spring over said prestress lever to provide a spring support at the extremity of the furniture frame and comprising an auxiliary spring body formed of pliable sheet material; a hook formed integrally with said body by bending a portion of the sheet material backwardly to overlap said body, said hook being adapted to hook about a first reach of said sinuous spring; a catch formed integrally with said body by bending an extremity of the sheet material adjacent to said hook outwardly of said hook and said body; and a clip formed integrally with said body at the end opposite said catch by bending the sheet material backwardly into overlying relationship with said body, said clip serving to attach said auxiliary spring to members of the spring assembly.

6. In a spring for mounting on a furniture frame; a sinuous spring shaped to have its length follow an arcuate path when said spring is in its relaxed condition; a prestress lever formed integrally with said sinuous spring to prestress said spring and thereby flatten its arcuate configuration when said spring is mounted on the furniture frame to improve the spring action of said spring for furniture applications; and means coacting with said prestress lever for reinforcing said spring to assist it in withstanding the forces developed by said prestress lever.

7. In a spring assembly for mounting on a furniture frame; a sinuous spring extending across the furniture frame and including a prestress lever to prestress said spring; an auxiliary spring extending from said sinuous spring to provide a spring support at an extremity of the furniture frame; mounting means for mounting said auxiliary spring to said sinuous spring; and reinforcing means on said auxiliary spring in engagement with said prestress lever to reinforce a portion of said sinuous spring.

8. In an auxiliary spring adapted to be mounted on a sinuous spring which comprises a plurality of parallel reaches disposed transverse to the length of the spring and connected to each other successively by semicircular portions; an auxiliary spring body formed of pliable sheet material; a hook formed integrally with said body for hooking about a first reach of said sinuous spring; a catch formed integrally with said body at one end thereof adjacent to said hook for engagement with a second reach of the sinuous spring to prevent said hook from being inadvertently displaced relative to said first reach and to thereby firmly secure the auxiliary spring to the sinuous spring; and a clip formed integrally at the opposite end of said body.

9. In an auxiliary spring adapted to be mounted in a spring assembly which includes sinuous springs that comprise a plurality of parallel reaches disposed transverse to the length of the spring and connected to each other successively by semicircular portions; an auxiliary spring body; means at one end of said body for securing the auxiliary spring to a plurality of reaches of the sinuous spring; and a clip formed integrally with the opposite end of said body for attaching the auxiliary spring to members of the spring assembly.

10. In an auxiliary spring adapted to be mounted on a sinuous spring which comprises a plurality of parallel reaches disposed transverse to the length of the spring and connected to each other successively by semicircular portions; an auxiliary spring body formed of pliable sheet material; a hook formed integrally with said body by bending a portion of the sheet material backwardly to overlap said body, said hook being adapted to hook about a first reach of said sinuous spring; a catch formed integrally with said body by bending the extremity of the sheet material adjacent to said hook outwardly of said hook and said body; and a clip formed integrally at the end of said body opposite said catch by bending the sheet material backwardly into overlying relationship with said body.

11. A spring assembly comprising a pair of spaced frame members, a sinuous spring extending between said frame members and including semicircular portions joined by parallel reaches, and an auxiliary edge spring comprising an integral flat sheet metal body having first and second ends, said first end including a substantially S-shaped portion extending in spaced overlapping relationship to said body to define a hook and a catch, said hook extending around one reach and said catch extending about an adjacent reach for supporting said auxiliary spring on said sinuous spring, said second end of said auxiliary spring including portion disposed about an edge wire.

12. A spring assembly as set forth in claim 11 wherein said second end of said auxiliary spring comprises a substantially U-shaped portion, said edge wire being supported in said U-shaped portion.

13. An auxiliary edge spring of the type supported on

a sinuous spring strip and comprising: an integral flat sheet metal body having first and second ends, said first end having a substantially S-shaped portion extending in spaced, overlapping, divergent relationship to said body to define a hook and a catch, said hook and said catch being sufficiently spaced from one another for engaging adjacent reaches of a sinuous spring strip, said second end having substantially U-shaped portion for supporting a border wire.

14. An auxiliary edge spring as set forth in claim 13 wherein said U-shaped portion extends rearwardly and in overlapping relationship with said body.

15. An auxiliary edge spring as set forth in claim 14 wherein said S-shaped portion is disposed on the opposite side of said body from the U-shaped second end.

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ARTHUR L. LA POINT, *Primary Examiner.*