May 2, 1939. A. KRAKAUER 2,156,728

SPRING STRUCTURE

Filed April 9, 1937 2 Sheets-Sheet 1

Fig. 1.

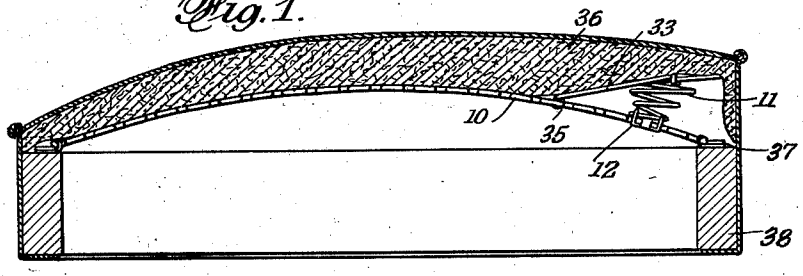


Fig. 2.

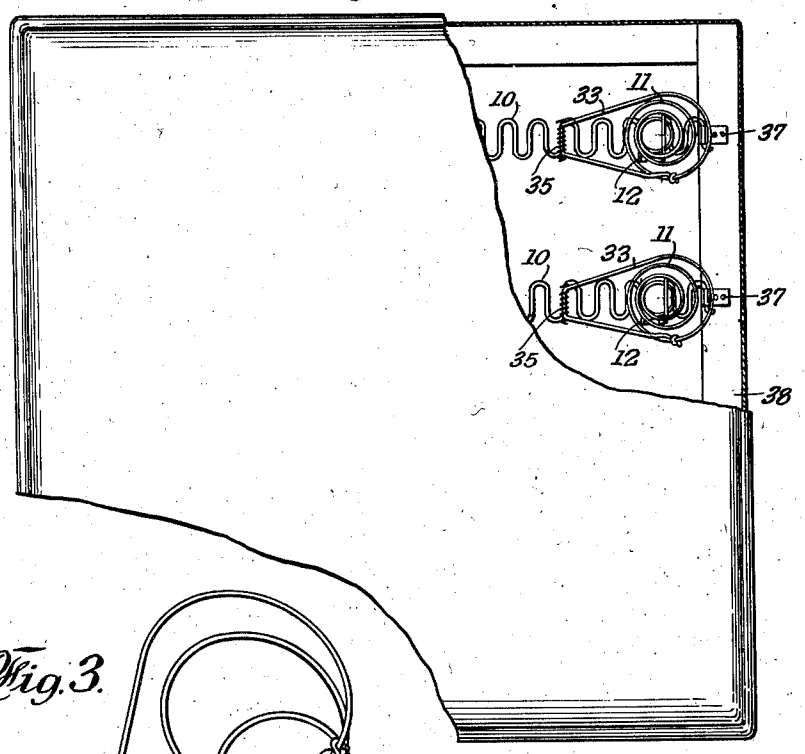
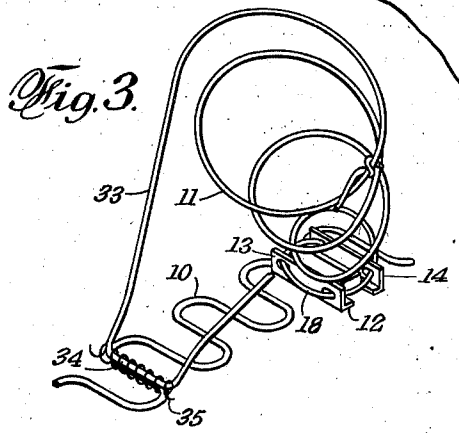


Fig. 3.



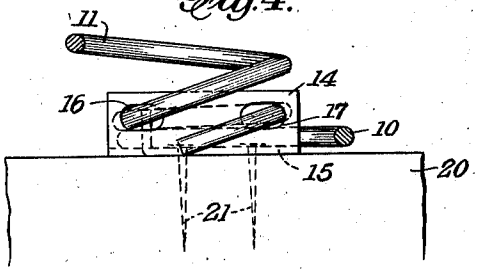
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May 2, 1939. A. KRAKAUER 2,156,728

SPRING STRUCTURE

Filed April 9, 1937 2 Sheets-Sheet 2

Fig. 4.



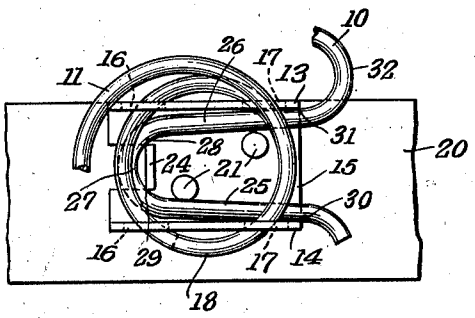


Fig. 5.

Fig. 6.

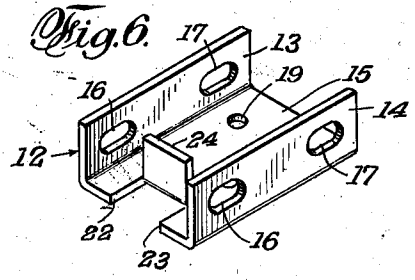


Fig. 7.

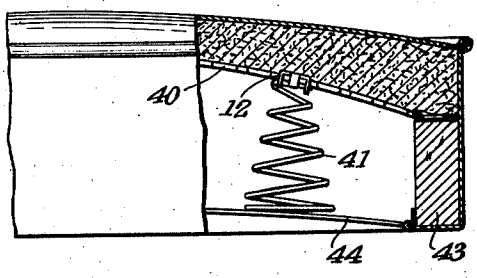
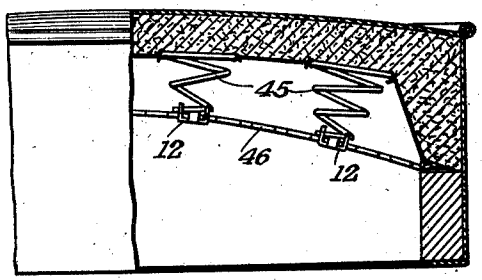


Fig. 8.



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Patented May 2, 1939

2,156,728

UNITED STATES PATENT OFFICE

2,156,728

SPRING STRUCTURE

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Application April 9, 1937, Serial No. 135,857

19 Claims. (Cl. 155—179)

This invention relates to spring structures and particularly to the spring means for producing in an article of furniture, an effective spring surface to be covered with upholstery and of the desired shape.

Sinuous arched elongated wire springs, of uniform thickness having a plurality of 180° turns arranged alongside each other, and known as "no-sag" springs have recently come into use for the seats, backs, etc., of upholstered furniture. Such springs are customarily spaced apart in parallel relation and secured at their ends to the frame of the article of furniture. Due to the arched form of such "no-sag" springs, it has been difficult to arrange such sinuous springs in any other manner than to produce a convex spring surface. Additional means, to fill out the surface at the points where the convexity is objectionable, have therefore been necessary. In the front edge of seats, for example, more or less complicated arrangements of peculiarly shaped or special springs have been used to provide the requisite yieldable front edge on the seat and to flatten or reduce the convexity of the front surface part of such seat. Such additional spring means have been more or less cumbersome, complicated and expensive.

My invention therefore contemplates the provision of a spring mounting, whereby a comparatively inexpensive standard coil spring may be arranged quickly and easily at any desired point of the sinuous or "no-sag" spring, thereby to change or level out the effective spring surface provided by the sinuous springs.

My invention further contemplates the provision of a simple clip adapted to frictionally engage the sinuous spring at any selected one of the bends or turns thereof, and when so engaged, being held to the sinuous spring and being adapted to support a helical or coil spring in the desired position, whereby the coil spring becomes adequately attached to the sinuous spring.

My invention further contemplates a spring mounting or installation including a combination of the sinuous and coil springs and connections therebetween whereby a spring surface of any desired shape and resiliency is provided for upholstery purposes.

The various objects of my invention will be clear from the description which follows and from the drawings, in which:

Fig. 1 is a vertical section of an article of furniture showing a frame thereof, and showing an upholstered part thereof supported by my new spring mounting.

Fig. 2 is a top plan view of the same, partly broken away to show the underlying spring structure.

Fig. 3 is a perspective view of a portion of a sinuous spring showing a coil spring connected thereto.

Fig. 4 is a fragmentary front view of a furniture frame edge showing a modification of my new spring structure wherein the coil spring is held by a clip which serves to secure the end of the sinuous spring to the frame.

Fig. 5 is a top plan view of the same.

Fig. 6 is a perspective view of the connecting clip used in the spring structure.

Fig. 7 is a partial section and partial side elevation of the seat of an article of furniture to which a modified form of my invention has been applied.

Fig. 8 is a similar vew of another modified form of the same.

In the practical embodiment of my invention which I have shown by way of example, the sinuous or "no-sag" spring 10 is preferably, though not necessarily, of the type disclosed in the patent to Kaden, No. 2,002,399, dated May 21, 1935, for Flat spring and the method of making the same. Said spring 10 is used to support a suitable coil spring 11, which may be of standard construction or other shape and of any desired thickness of wire. The coil spring is secured in place at the desired point of the sinuous spring by means of a suitable clip 12.

Referring to Fig. 6, it will be seen that the clip 12 is U-shaped in cross-section, being formed preferably of sheet metal and having outstanding spaced and preferably parallel sides 13 and 14 and a bottom 15 integrally joining said sides. Each of the sides 13 and 14 is provided with suitable spaced and preferably elongated perforations as 16, 17 intermediate the edges and ends thereof. The perforations are adapted to receive the end coil 18 of the coil spring 11 by a threading movement to be later described more fully. The bottom 15 may be provided with one or more perforations 19 for the passage of a nail, screw or other fastening element 21 to permit the clip to be secured, if desired, to a supporting surface such as the wood or the like frame 20 of Figs. 4 and 5.

At an end part of the clip 12, a pair of preferably parallel spaced cuts as 22, 23 are made in the bottom 15 and the material between the cuts is turned or bent in a direction to project from the bottom and to form the lug or stop member 24 of less width than that of the bottom

and preferably, though not necessarily, of less height than that of the sides 13, 14. Said member 24 is preferably arranged to extend between the pair of opposed perforations 16. The distance between the inner faces of the sides 13, 14 is preferably about the same or slightly less than the distance between the points 30 and 31 at the ends of the outermost edges of the adjacent bend-connecting parts 25 and 26 which connect the substantially 180° bends or turns of the sinuous spring 10. The width of the member 24 is less than the diameter of the bends 27, 32 so that it engages the bend 27 at two spaced points as 28, 29, to assume a position as a chord of the bend.

It will be seen that the clip 12 may readily be arranged at any one of the bends of the sinuous spring by merely inserting the member 24 on the inside of the selected turn or bend 27 in the position of a chord thereof, with (Fig. 5) the spring portions 25, 26 engaging the upper face of the bottom 15. In the thus assembled position of the clip on the spring, the connecting parts 25 and 26 of the spring engage the clip sides 13 and 14 as at 31, 30 and relative movement thereof in any direction except downwardly, is prevented. In other words, the clip is frictionally secured to the sinuous spring against relative movement except by a withdrawal movement of the clip or spring in a direction at right angles to the plane of the bottom. If such withdrawal movement is prevented, then the clip cannot be withdrawn from the spring. Relative movement longitudinally of the clip in one direction is prevented by the engagement of the inner faces of the clip sides as at 30, 31 with the extremities of the respective bend-connecting parts 25, 26 of the spring. Relative movement in the other direction is prevented by the engagement of the member 24 with the bend 27 as at 28, 29. The spring lying as it does against the bottom 15, it cannot be moved toward the bottom. When the end coil 18 of the coil spring 11 is passed through the perforations 16, 17 by screwing the end of said end coil through said perforations, to mount the coil spring on the clip, then the spring 10 cannot be lifted off the clip and the parts are firmly though detachably secured together. The perforations 16, 17 are preferably elongated to permit the threading therethrough of end coils differing in character or made of wire of different thicknesses and to allow for irregularities. The end coil becomes arranged outside of the member 24 (Fig. 5) and above the sinuous spring and holds the latter spring down on the clip.

By means of my new clip, it becomes possible, therefore, to arrange a coil spring at any selected point of the sinuous spring 10 and in any position as is indicated for example in Figs. 1, 2, 3, 7 and 8. It is obvious that the clip may be arranged to engage any one of the turns 27, or any of the opposed turns 32 on the other edge of the spring by reversing the position of the clip through an angle of 180° in a horizontal plane from the position shown in Fig. 5. The coil spring 11 may be of any height or any desired diameter and of any shape required and any number of them may be used to produce an upper or lower effective spring surface in spaced relation to the surface normally provided by the sinuous springs.

As shown in Figs. 1, 2 and 3, in order that the otherwise free end of the coil springs be properly anchored, so that pressure thereon may be transmitted to the sinuous spring, the end coil 33 is elongated and provided with a substantially straight part 34 corresponding in length to the length of one of the bend-connecting parts 25, 26 of the sinuous spring. The parts 34 and 25 may be held together in any suitable manner, but preferably by means of a helical spring 35 of comparatively thin wire and of a diameter sufficient to permit it to be screwed around the parts 34 and 25. It will be understood, however, that the outer end coil of the coil spring 11 may be otherwise held in its proper position in any of the usual ways in which the otherwise free ends of said coil spring are supported, as by the customary clips, twine or the like.

In Figs. 1 and 2, I have shown my invention applied to form a spring edge on a furniture seat, and to partially flatten out the front edge portion of said seat without the necessity for using excessive upholstery or stuffing material 36. In this form of my invention, the clip 12 is arranged on the sinuous spring 10 rearwardly of the front end of said sinuous spring. Said front end may, if desired, be secured to the frame by arranging it in its proper position in another suitable clip 37 secured to the edge of the frame by the usual fastening elements. The coil spring 11 of Fig. 1 may be arranged as close as is desired to the front edge of the frame 38 or in rearwardly spaced relation thereto, the place of arrangement being such that the front edge of the resulting cushion seat is adequately yieldingly supported. It will be understood that additional springs 11 may be arranged in the same or other manner and secured by the clips 12 at other selected points of the sinuous springs 10 if desired and hence no illustration thereof is required.

When the coil spring is arranged to extend above the sinuous spring, it will be seen that pressure on the seat or furniture back or other furniture part to which my spring structure is applied, exerts pressure on the coil spring which in turn transmits the pressure to the sinuous spring and that both yield to an extent depending on the relative stiffness of said springs, so that a unitary spring structure is thus provided.

It will also be seen that by the proper arrangement of coil springs of the proper height along selected points of the sinuous springs, an outer surface may be provided on the article of furniture whether it be a seat or other part, which may be horizontal or nearly so, in spite of the convexity of the sinuous or "no-sag" springs, or which may be partly horizontal and partly convex, or of any other desired shape.

By means of my improved arrangement whereby a coil spring may be attached at any desired point of the sinuous spring, in substantially any desired position, my new spring structure is very flexible and accommodates itself to a number of varied arrangements. As is shown for example in Fig. 7, the sinuous spring 40 may be supported by any number of coil springs 41 connected thereto by means of my improved clips 12. The unconnected or free lower ends of the coil springs may rest on any suitable support 44, flexible or rigid and suitably connected to the frame 43. In this form of my invention, the sinuous spring may be made of any desired flexibility, being aided in its supporting properties by the coil spring 41.

As shown in Fig. 8, the coil springs 45 of the same or different height may be secured to and extend above the sinuous spring 46 to any desired

extent, thus to form an effective spring surface of different shape from the surface passing through the sinuous springs, said effective surface being determined by the upper ends of the coil springs. Said upper ends of the coil springs may be left free or tied together in a manner well known in the art.

It will be seen that I have provided a spring structure including sinuous springs and coil springs adapted for adequate connection to each other in any desired arrangement and therefore having a wide range of application to various parts of and various types of furniture. It will also be seen that I have provided a novel clip designed to permit the arrangement of a coil spring in substantially any position and on any part of a sinuous spring in a simple and efficient manner.

While I have shown and described certain specific embodiments of my invention, I do not wish to be understood as limiting myself thereto since I desire to claim my invention as broadly as may be permitted by the state of the prior art and the scope of the appended claims.

I claim:

1. The combination with a sinuous spring having a plurality of substantially 180° bends joined by straight bend-connecting portions, each of said bends facing in the opposite direction to the direction in which the adjacent bends face, of a coil spring arranged with its axis at substantially right angles to the plane of an adjacent bend of the sinuous spring, and said axis being also arranged to pass between the lines tangent to the respective outermost points of alternate bends, a sheet metal clip having a perforation therein, part of the end coil of the coil spring passing through said perforation, said clip having a flat portion engaging a face of the sinuous spring and drawn toward said sinuous spring by the pressed engagement of said end coil with the other face of the sinuous spring on the rotation of said coil spring in the proper direction about its axis, said clip having an outstanding lug engaging a bend of the sinuous spring.

2. In a spring installation, an arched sinuous spring of wave form having a plurality of transverse bends therein integrally joined by substantially straight bend-connecting portions, a coil spring on one face of the sinuous spring and overhanging one of said bends and transmitting pressure put thereon to the sinuous spring, and preformed means connecting the end coil of the coil spring to a selected bend of the sinuous spring, said means comprising a sheet metal clip having a flat part in contact with the other face of the sinuous spring and having a perforation therein through which the coil spring is screwed to confine the sinuous spring between part of the coil spring and said flat part of the clip.

3. In a spring installation, a sinuous spring having transverse bends, a coil spring, and means connecting said springs to transmit to one spring pressure put upon the other spring comprising a clip having a bent portion frictionally engaging a bend of the sinuous spring and having another portion thereof provided with a passageway for the end coil of the coil spring, said end coil being passed through said passageway and engaging one face of said bend, said clip having another portion engaging the other face of said bend.

4. In a spring structure, a sinuous spring having transverse substantially semi-circular bends connected by substantially straight bend-connecting portions, a coil spring on one face of the sinuous spring and means connecting said springs comprising a perforated clip having a bottom engaging the other face of the sinuous spring, and a lug projecting from the bottom and engaging a selected bend of the sinuous spring, said clip having projections thereon engaging those of said bend-connecting portions adjacent said bend, the end coil of the coil spring passing through the perforations of the clip and on the rotation of the coil spring in the proper direction about its axis pressing said selected bend against said bottom of the clip.

5. In a spring structure, a sinuous spring having substantially semi-circular bends therein, a coil spring arranged at a selected one of said bends and having an end coil crossing said bend and engaging one face thereof and rigid preformed means of predetermined shape connecting said springs and engaging the other face of said one bend, said means maintaining said springs against accidental separation, but being removable from said springs while maintaining said predetermined shape.

6. In a spring structure, an arched sinuous spring having a series of opposed semi-circular bends therein, a coil spring arranged at and engaging one face of one of said bends with its axis intersecting the sinuous spring, and a one-piece perforated clip engaging the other face of said one of said bends, the end coil of the coil spring passing through a perforation of said clip.

7. In a spring structure, a sinuous spring having substantially semi-circular bends therein, a coil spring arranged at one of the bends, and a clip having a part interposed between spaced points of and engaging said one of the bends, preventing relative transverse movement thereof, said clip having another part arranged on one side of said bend, the end coil of the coil spring passing through the clip on the other side of said bend and thereby holding the clip against falling off the bend laterally.

8. In a spring structure, a sinuous spring, a coil spring arranged at and on one face of a bend of the sinuous spring, and a rigid one-piece sheet metal clip having an outstanding lug part engaging said bend and interposed between spaced points thereof and having another bottom part contacting the other face of the bend, the end coil of the coil spring passing through the clip and having at least part thereof arranged at said one face of the bend.

9. In a spring structure, a sinuous spring, a coil spring arranged at a bend of the sinuous spring, a clip removably securing an end coil at one end of the coil spring to the sinuous spring, an elongated end coil at the other end of the coil spring, and a helical spring threaded about the elongated end coil and part of the sinuous spring to hold said elongated end coil to the sinuous spring.

10. A spring-holding clip adapted to frictionally fit about a 180° bend of a sinuous spring and adapted to support a coil spring with the axis of said coil spring at substantially right angles to the plane of said bend, comprising a flat bottom portion, a lug upstanding integrally from the bottom portion inwardly of one end thereof, and a pair of upstanding perforated sides each integral with and upstanding from an edge of the bottom portion and of greater height than that of the lug, said sides being spaced apart a distance at least equal to the diameter of said bend.

11. A U-shaped clip having a bottom and a pair of substantially parallel sides upstanding from the bottom and integral therewith, said sides being perforated, and a lug integral with and upstanding from the bottom in a plane at substantially right angles to the planes of the sides and of less width than that of the bottom.

12. A clip of a single piece of sheet metal having a flat bottom portion, a lug outstanding integrally from the bottom portion and at substantially right angles thereto and arranged inwardly of one end thereof and a pair of spaced parallel perforated sides outstanding from the bottom and arranged in planes at substantially right angles to those of the bottom and of said lug.

13. A one-piece clip for use in holding a coil spring to any selected point of a sinuous spring, said clip having a pair of perforated sides, a bottom connecting said sides and a lug outstanding from said bottom and extending between said sides and arranged centrally therebetween.

14. A one-piece spring-holding clip comprising a bottom, a pair of spaced sides outstanding from the bottom and perforated, and a lug outstanding from the bottom between said sides.

15. In a clip for use in holding a coil spring to any selected bend of a sinuous spring, a bottom, a pair of sides outstanding from the edges of the bottom and integral therewith, each of said sides having a pair of spaced perforations therein, each of the perforations being near an end of the sides, and a lug integral with and outstanding from the bottom in the same direction as that of the sides and arranged between and substantially aligned with a corresponding pair of the perforations near one end of the sides.

16. In combination, a sinuous spring having a plurality of bends therein, a coil spring on one face of the sinuous spring, and means connecting the end coil of the spring to the sinuous spring at any selected point of the sinuous spring comprising a sheet metal clip having a pair of outstanding substantially parallel sides provided with perforations for the passage of said end coil, said sides being spaced apart a distance equal to that between adjacent transverse bends of the sinuous spring and receiving a part of the sinuous spring therebetween, said clip having a bend engaging member of less height than that of the sides and arranged in a plane at right angles to the planes of the sides and having a width less than the space between said sides and sufficient to engage transversely spaced points of a bend of the sinuous spring, said clip having a bottom connecting said sides and bend-engaging member and arranged in contact with the other face of the sinuous spring, said end coil passing through the perforations.

17. A clip of a single piece of sheet metal having a flat bottom portion, a lug outstanding integrally from the bottom portion and at substantially right angles thereto, and a pair of spaced parallel side portions outstanding from the bottom portion and arranged in planes at substantially right angles to those of the bottom portion and of said lug, at least one of said portions having a perforation therein for the passage therethrough of part of the end coil of a coil spring.

18. A one-piece clip for use in holding a coil spring to any selected point of a sinuous spring, said clip having a pair of side portions, a bottom portion integrally connecting said side portions, and a lug outstanding from said bottom portion and arranged centrally between the side portions, said clip having a passageway therein for the passage of part of the end coil of the coil spring.

19. The combination of a sinuous spring having a plurality of bends therein, a coil spring arranged with one of its coils resting on one face of the sinuous spring, and means connecting the end coil of the coil spring to the sinuous spring at any selected point of the sinuous spring comprising a sheet metal clip engaging the other face of the sinuous spring and having a pair of outstanding substantially parallel sides, a bend and portions of the sinuous spring adjacent the bend being arranged between said sides, said sides being spaced apart a distance equal to that between adjacent transverse bends of the sinuous spring, said clip having a bend-engaging member arranged in a plane at right angles to the planes of the sides and having a width less than the space between said sides and sufficient to arrange the edges of said bend-engaging member in engagement with transversely spaced points of a bend of the sinuous spring, said clip having a passageway therein, said passageway having a part of said one coil of the coil spring threaded therethrough and pulling said one coil against the sinuous spring and compressing the sinuous spring between said one coil and the clip.

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