Feb. 20, 1934. C. S. REED 1,948,130

SPRING STRUCTURE

Filed Sept. 6, 1932 3 Sheets-Sheet 1

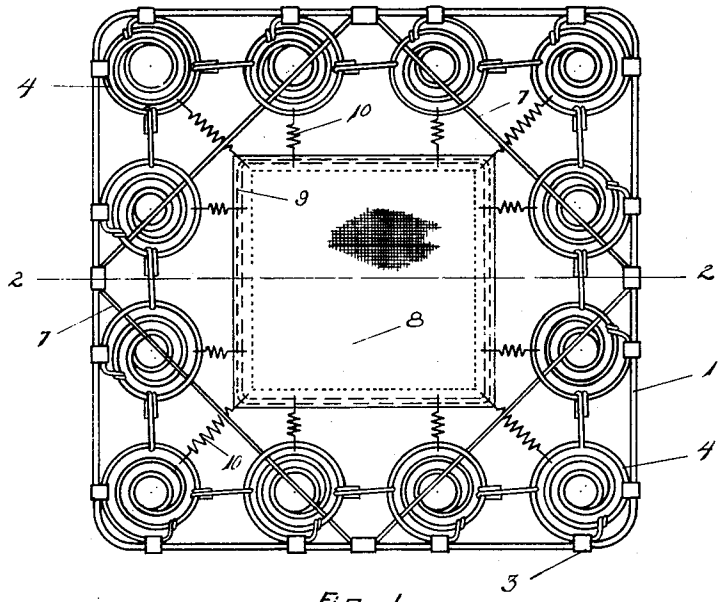


Fig. 1

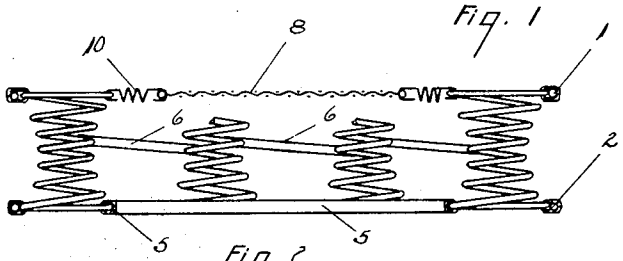


Fig. 2

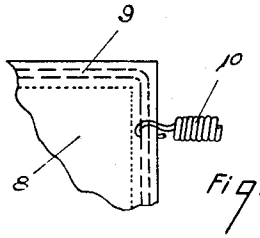


Fig. 3

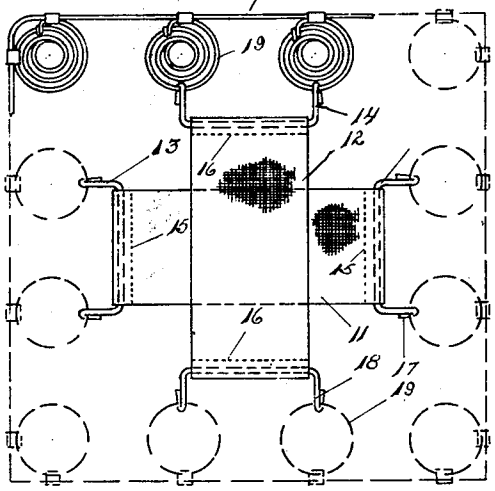


Fig. 4

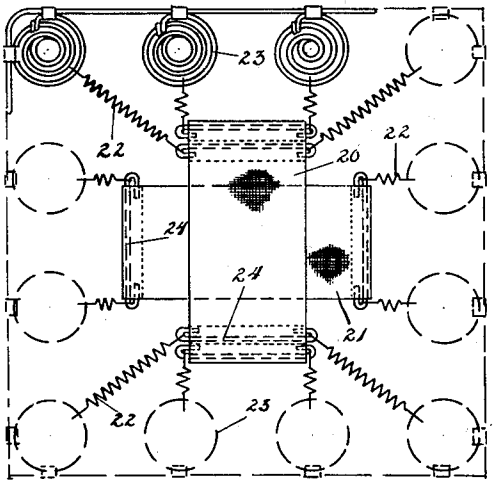


Fig. 5

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SPRING STRUCTURE

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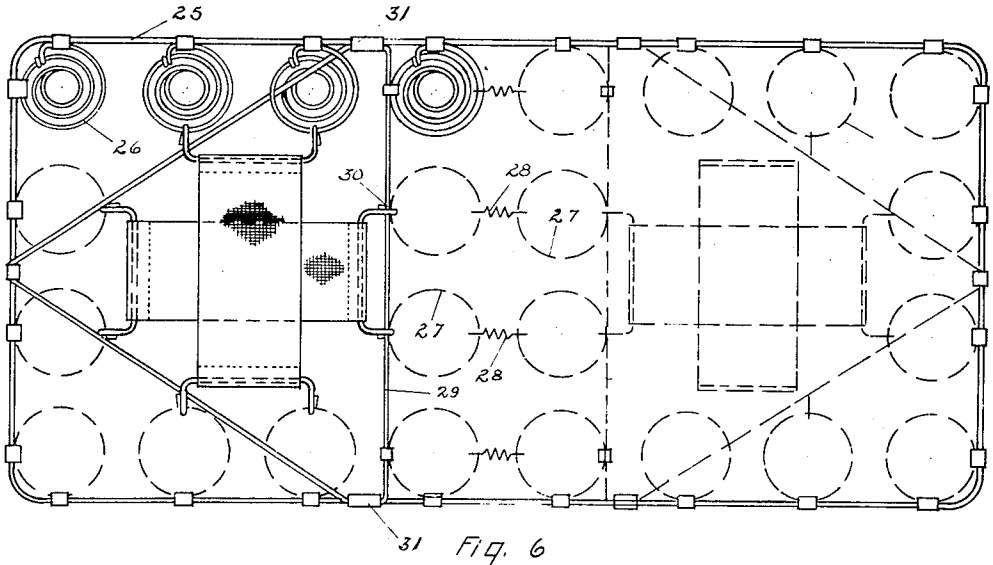


Fig. 6

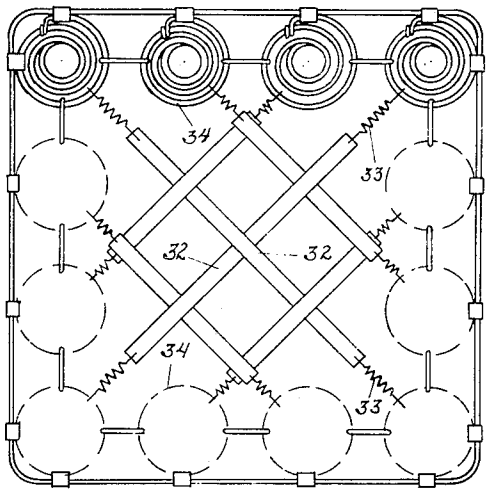


Fig. 7

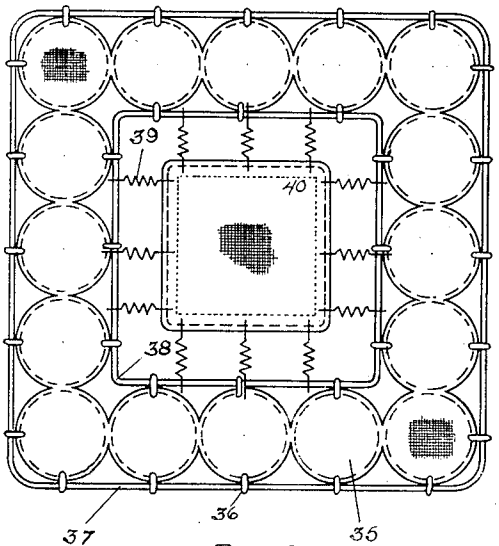


Fig. 8

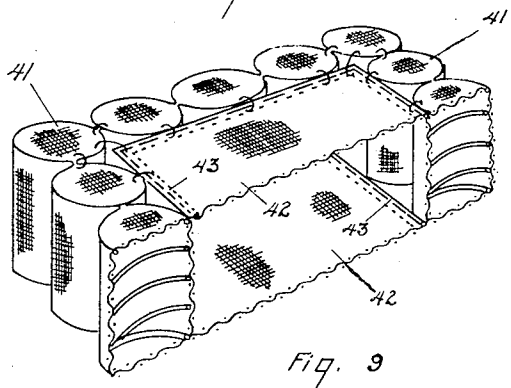


Fig. 9

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SPRING STRUCTURE

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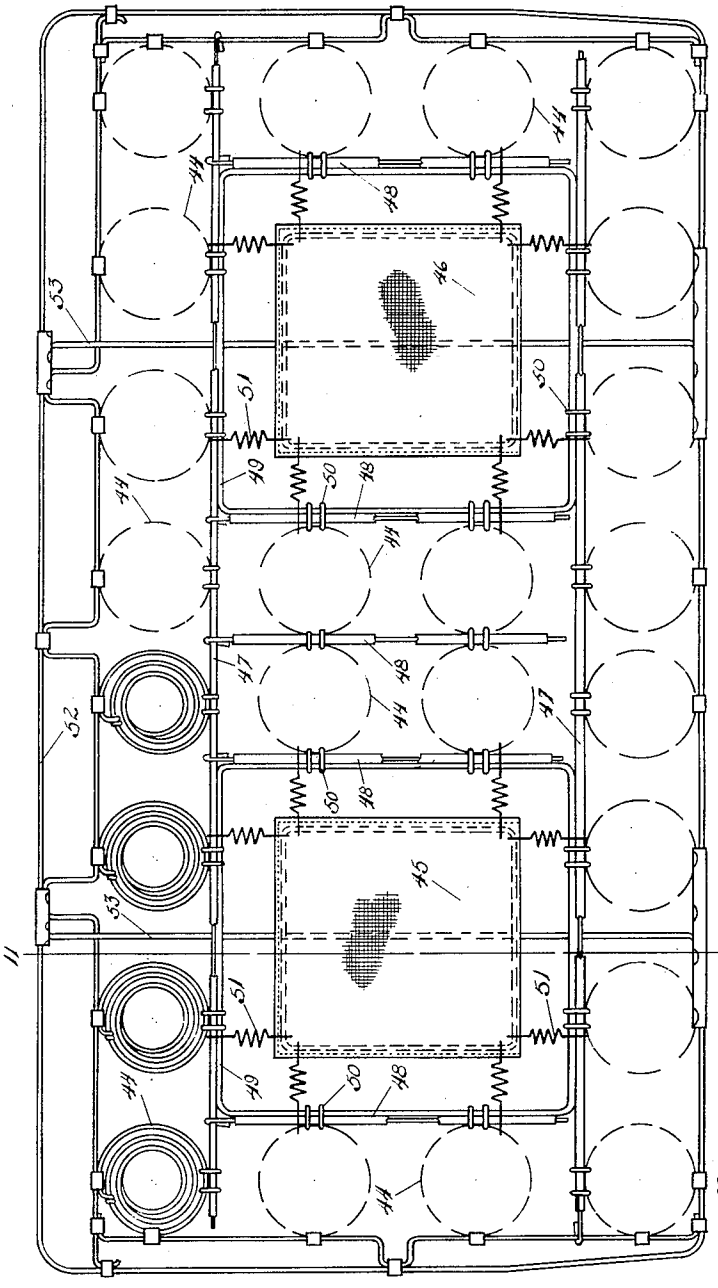


Fig. 10

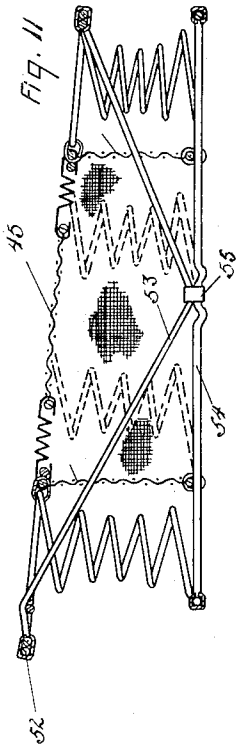


Fig. 11

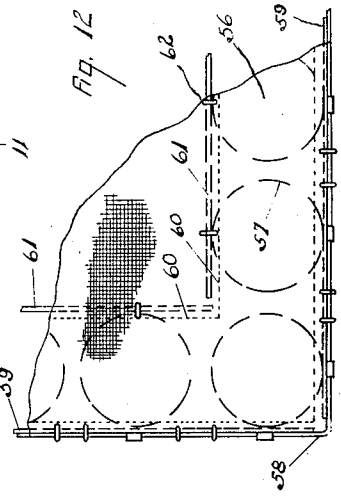


Fig. 12

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UNITED STATES PATENT OFFICE

1,948,130

SPRING STRUCTURE

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Application September 6, 1932. Serial No. 631,874

3 Claims. (Cl. 155—179)

This invention relates to an improvement in spring construction for seats, backs, mattresses, cushions and analogous structures in which a resilient surface is presented by coiled springs, and the like, and upholstered or otherwise trimmed to produce the finished product.

Although my improved spring construction is in no sense limited to seat and back structures for vehicles, the majority of the herein described forms which my invention may take are particularly adapted for employment in vehicle bodies. For this reason the objects and advantages hereinafter set forth will have specific reference to the vehicle seats and backs, but such objects and advantages are intended to extend to other types of construction wherein any one of the desired characteristics of the vehicle back and seat would be advantageous.

Herebefore it has been deemed necessary, particularly in vehicle seats and backs, to provide coil springs in the localities directly supporting the occupant. As a result of such construction, it has been necessary to resort to various means, and for the most part expensive means, in order to overcome certain disadvantages inherent therein, in order to produce a spring construction meeting the following demands of the trade: (1) Satisfactory "feel" or yieldable resiliency, (2) silent operation, (3) elimination of the tendency to throw the occupant upon recoil, (4) elimination of any decided vibration of the occupant of the car upon sudden shock, (5) ability to be evenly, uniformly and economically trimmed or upholstered.

In my improved spring construction which I prefer to refer to as "suspended center" construction, the required characteristics of the trade heretofore enumerated are inherent therein. These have resulted from the elimination of the usual coils directly supporting the occupant and the substitution of a resilient central supporting surface suspended from the border coils in a plane transverse the axis of the border coils. With the elimination of the central coils, the construction is rendered decidely quieter in operation for it is in this locality that the maximum relative movement takes place between parts in the conventional construction. The elimination of the center coils also provide a deeper seat or back construction without resorting to the expense of constructing a dropped central bottom portion. Furthermore, by suspending the central supporting surface in a transverse plane relative to the longitudinal axis of the border coils and the direction of vibration of the occupant, there is a tendency for the entire construction to immediately return the central supporting surface to its normal plane. This effecting a decided damping action upon repeated vibration of the occupant subsequent to a sudden shock and eliminating the objectional throwing of the occupant upon recoil beyond the normal level of the seat.

Stated more specifically, one of the primary objects of this invention is to provide a spring construction in which a suspended supporting center is secured to the border spring coils in a manner permitting the entire construction to function as a unit.

Another object of this invention is to provide a spring construction in which a yieldable central supporting surface is resiliently suspended from the border coils transversely to the longitudinal axis thereof.

A further object of this invention is to provide a spring construction which may be easily, uniformly and economically trimmed and avoids all crowning of the central portion to an abnormal elevation as a result of tension placed upon the border coils during trimming.

A still further object is to provide an economical spring construction, materially reducing the labor, and parts cost, with improved riding qualities and without sacrificing durability.

These and other objects and advantages will appear as the description proceeds. It is to be clearly understood, however, that I do not wish to be limited to the exact details set forth in the description and the drawings, but I intend to include as part of my invention all such changes and modifications as would occur to those skilled in the art and fall within the scope of the claims.

In the accompanying drawings wherein a considerable number of preferred forms which my invention is capable of taking are disclosed,

Fig. 1 is a plan view of one form of my improved suspended center spring structure.

Fig. 2 is a cross sectional view taken on line 2—2 of Fig. 1.

Fig. 3 is an enlarged detail of the reinforced fabric center.

Fig. 4 is a plan view of a modified form of suspended center in the form of crossed webbing.

Fig. 5 is a plan view of a modified form, similar to that shown in Fig. 4, in which the webbing is suspended from helical springs.

Fig. 6 is a plan view of one form my invention may take when employed in seat or back construction accommodating two or more occupants.

Fig. 7 is a plan view of a modified form in which the suspended center consists of interwoven spring steel strips.

Fig. 8 is a further modified form in which the suspended center construction is adapted to Marshall type of construction.

Fig. 9 is a still further modified form in which Marshall type of construction particularly adapted for boxed coiled cushions and the like is provided with a suspended center.

Fig. 10 is a plan view of a modified construction showing the suspended center construction employed in combination with border coils retained under compression by strips of fabric.

Fig. 11 is a cross sectional view taken on line 11—11 of Fig. 10.

Fig. 12 is a plan view of a modified construction in which the suspended center is reinforced by a fabric covering the entire top of the construction.

Having reference to the drawings, in Fig. 1 is shown a spring construction which may have the usual upper and lower border frames designated 1—2, respectively. Clips 3 may be employed to secure the border coils 4 to the frames 1—2. The coils 4 are illustrated as being of double cone knotted type, but they may be unknotted or knotted or barrel or other suitable longitudinally compressible type. The lower frame 2 may be of sheet metal U-shaped construction in which the lower portion of the coils 4 is pinched. As shown in Fig. 2, the lower portion of the coils 4 are additionally spaced and braced by U-bars 5 pinched upon the inside of the lower coil. Short U-bars 6 may also be pinched to intermediate portions of adjacent coils 4 in order to provide the necessary transverse rigidity to the construction. A four-way brace 7 may be clipped to the upper frame to further stiffen the construction.

The foregoing described type of bracing has the advantage of eliminating the conventional diagonal brace connecting the upper and lower frames. Obviously, however, any of the well known methods of bracing may be employed without departing from the scope of my invention. In this sufficiently rigid shell of border coils, there is suspended a supporting surface 8, preferably of yieldable material. As shown in Figs. 1 and 3, the supporting center is of fabric having the edges thereof reinforced by a wire member 9. Helical springs 10 or the like are secured to the upper portion of the border coils 4. Although it is not absolutely necessary that the surface 8 be suspended from all the border coils as is shown in Fig. 1, it is highly essential that it be suspended from the coils intermediate the corner border coils, at least, in order that the majority of the supported load placed upon the surface 8 will be transmitted to entire construction and the same will function as a unitary structure. Any decided relative movement or sharply defined individual action by various localities of a spring construction upon compression is detrimental to the "feel" as well as to the durability of the padding, and the like, supported on the burlap covering the spring construction and held in position by the trim. Obviously, it is not necessary to suspend the helical springs 10 directly from the coils as they may be indirectly connected and yet transmit the supported load placed on the suspended center uniformly to substantially all the border coils.

The performance of the above described construction may be described as follows: In the "bucket" type of construction in Fig. 1, the bulk of the supported weight of the occupant will be concentrated upon the suspended center portion and transmitted to the coils 4 through the helical springs 10. This results in a graduated deflection of the entire construction downwardly and inwardly to produce a deep seated hammock like effect. The ability of the suspended center to be deflected substantially the depth of the seat construction without encountering any structure, provides more head room in the vehicle and gives the construction a deep seated effect without the employement of a dropped center.

As a result of the deflection of the entire construction, including the upper border, inwardly during use, there is a tendency for the entire border assembly to bring the surface 8 back into its normal transverse plane and retain it in that position. This tendency has a decided damping effect upon the vibration of the occupant after a sudden shock. Also, the ability to throw the occupant beyond the normal expansion of the coils is not present as in the usual center coil type in which the direction of compression and expansion is parallel with the direction of vibration of the occupant; the resilient suspension of the supporting center portion transversely the direction of vibration of the occupant appears to dissipate the storage of energy resulting from extension of the helical springs and compression of the border coils with insufficient force components parallel with the vibration of the occupant to noticeably carry the occupant beyond the normal compression height of the construction.

Another decided advantage residing in the above described construction over the prior art consists in the ability to be uniformly and economically trimmed. It is the usual practice to cover the top of the spring construction with burlap to support a padding of cotton or similar material which is held in position by the trim. As will be readily apparent, the construction shown in Fig. 1 presents a comparatively regular surface and eliminates, to a decided degree, the tendency of the padding to accumulate in irregular bunches. Because of the regularity of the surface, it is not necessary to employ as much padding to smooth out the feel of the construction as has been herebefore necessary in construction having the usual center coils. Furthermore, during the trimming operation, the tension placed upon the border coils does not result in a crowning of the center portion and for this reason the construction may be more evenly and uniformly trimmed. The elimination of crowning in "bucket" type of construction greatly improves the riding qualities of this type of seat in that the tendency for the occupant to roll to either side when the vehicle deviates from a straight forward movement is materially reduced.

The operation and characteristics of the construction shown in Figs. 1–3 have been described in length. In general the foregoing description with reference to operation and advantages is characteristic of the numerous modifications to hereinafter be described.

In Fig. 4 is illustrated a modified form of construction which may be similar in all respects to the construction shown in Figs. 1–3 with the exception that the suspended center consists of flexible strips 11—12, preferably of strong woven webbing, crossing each in the center of the construction. U-shaped members 13—14 are secured at the ends of the strips 11—12, for example, by being inserted in a hem formed by stitching at

15—16. The ends of the members 13—14 are hooked at 17—18 to receive the top portion of the coils 19. Preferably, the coils 19 are of the knotted type with the knotted portion removed from the portion of the coil from which the members 13—14 are suspended. This permits the transverse resiliency of the coils to be imparted to the suspended center.

The construction shown in Fig. 4 may be very economically fabricated and although perhaps not quite as luxurious in feel as the construction shown in Fig. 1 in which helical springs are employed, the individual action of the crossed webbing and the utilization of the transverse resiliency of the upper portion of the coils 19, result in a construction having a very satisfactory feel.

In the modification shown in Fig. 5, the advantages of the crossed webbing and the helical springs have been combined. As illustrated, webbings 20—21 of fabric or the like are crossed in the center of the construction and are suspended by helical springs 22 extended to and secured to the border coils 23. The springs 22 are preferably secured to the webbings 20—21 by being fastened to hooked members 24 located in pockets formed in the webbings 20—21 by stitching. Aside from the additional resiliency imparted to the suspended center, this construction has the advantage of being suspended from all the border coils and thus the entire construction functions as a unitary structure.

In Fig. 6 is illustrated one possible manner in which my improved type of suspended construction may be adapted to a full construction seat or back or the like. As shown, the usual top border frame 25 extends around the entire construction. Border coils 26 extend around the entire top frame and may be braced in the construction in the manner described with reference to Figs. 1–2. Coils 27 are provided in the center of the construction and may be secured together by helical springs 28 in lieu of the usual wire keys. Brace wires 29 extend on opposite sides of the coils 27 which are clipped thereto at 30. The braces 29 are in turn clipped to the border frame 25 at 31. To the coils 26—27, I have shown suspended the type of center construction shown in Fig. 4. Obviously, any of the numerous types of suspended center construction herein disclosed may be employed.

In Fig. 7, a further modification is disclosed in which flexible thin spring steel strips 32 are interwoven to form a center supporting surface. The strips 32 have helical springs 33 or the like secured to their end portions and extend to and are secured to the border coils 34.

In Fig. 8 my improved suspended center construction is shown adapted to the Marshall type of spring construction. As shown, a border of fabric encased coils 35 are clipped at 36 to a border frame 37. The coils 35 are preferably of the unknotted barrel type and are additionally reinforced and spaced by an inner border frame 38 to which the coils 35 are clipped. Suspended from the coils 35 and the inner frame 38 upon helical springs 39, I have shown a reinforced supporting surface 40 which may be identical with that shown in Fig. 1. Obviously, any other of the disclosed suspended center constructions could be advantageously employed. This construction reduces the fabrication of the Marshall type of construction to such a degree that the same may now be employed in fields from which the cost of production has herebefore been a barrier.

In Fig. 9 is illustrated a Marshall type of spring construction which is adapted to be employed as a spring filler in loose reversible cushions and the like. As shown, a continuous border row of fabric encased barrel type of coils 41 are clipped at top and bottom to spaced fabric supporting surfaces 42 reinforced at the edges by wire frames 43 or the like. If desired, the space between the fabric may be filled with air moss or the like or even a large diameter coil spring of light gage wire may be inserted advantageously.

With reference to the modifications shown in Figs. 10–11, my improved suspended center is illustrated as adapted to a construction of the general type disclosed in the patent to Costigan, granted February 23, 1932, and bearing Number 1,846,848, wherein the coils are retained under a predetermined compression by strips of fabric between adjacent coils of springs. As shown, a full type construction has two sets of border coils 44 bordering suspended center portions 45—46, which are shown as similar to the construction shown in Fig. 1, but which may be of any of the numerous types herein disclosed. Strips of fabric 47 having wires reinforcing the edges are clipped to the upper and lower portion of the coils 44 as shown in Fig. 11 and retain the coils under a predetermined degree of compression. Likewise, similar strips of fabric 48 extend normally of the strips 47 and cooperate with the same to maintain the coils inwardly of the longitudinal edges of the construction under compression. An inner border frame 49, borders the two sets of border coils. Hog rings 50 or the like may be employed to clip the coils 44, the fabric strips 47 or 48 and the frame 49 together as a unit. The helical springs 51 are secured to the fabric and extend to and are hooked upon the frames 49. Obviously, the springs 51 could be hooked directly to the coils 44 if desired rather than indirectly as shown. In order to impart the necessary rigidity to the construction and support the over hanging portion 52, cantilever braces 53 are anchored to the bottom braces 54 at 55. Although the braces 53 are directly under the suspended center portion, by deflecting and anchoring the same at 55, the centers 45—46 may be compressed substantially to the bottom of the construction without interference.

Fig. 12 discloses a modification in which a fabric 56 covers the entire top of the assembly of border coils 57 and border frame 58. The outer edge of the fabric 56 is hemmed and reinforced by a wire 59 before being clipped to the frame 58. The portion of the fabric 56 extending over the center of the construction is reinforced by stitching a superimposed fabric along lines 60 to constitute the suspended center construction. A wire frame may be employed to reinforce the seam of the reinforced fabric. The reinforced central supporting area is suspended from the border springs 57 by clips 62. This type of construction eliminates the employment of burlap to support the padding during the trimming operation.

With reference to any one of the modifications herein shown, it may sometimes be desirable to superimpose, upon the suspended center construction, a padding of small fabric encased coils or other well known type of resilient padding in addition to the usual padding employed in the trimming operation.

Regardless of the specific form of border frames and brace members and regardless of the specific form of suspended central supporting

surface, my invention resides broadly in the suspension of a supporting surface from a border of coils positioned in spaced relations; the surface being transversely disposed to the longitudinal axes of the coils and the interconnection between the surface and the border coils being such as to effect a uniform and graduate inwardly and downwardly deflection upon a downward deflection of the supporting surface.

Having described my invention what I claim as new and desire to be covered by Letters Patent is:

1. In a spring structure, the combination with an upper border frame of wire having angularly disposed sides, of marginal springs clipped to and spaced along said sides, a central supporting surface transversely disposed relative to the longitudinal axes of said springs, means connecting the marginal edges of said surface with said springs spaced along the sides of said upper frame whereby said surface is suspended in substantially the plane of said upper frame, said connecting means uniformly distributing a load supported by said surface to said marginal springs spaced along said sides.

2. In a spring structure, the combination with an upper border frame of wire having angularly disposed sides, of marginal springs having the top coils thereof clipped and spaced along said sides, a central supporting surface transversely disposed relative to the longitudinal axes of said springs, means suspending said surface from the top coils of said springs spaced along the sides of said upper frame whereby said surface is supported in the plane of said upper frame and top coils, said suspending means uniformly distributing a load supported by said surface to said top coils and sides of said upper frame, said sides upon downward deflection of said surface being urged inwardly.

3. In a spring structure, the combination with an upper border frame of resilient wire, marginal springs compressible normal to the plane of said frame having the top coils thereof secured to and spaced along the inside of said frame, a central supporting surface located in substantially the plane of said frame occupying the larger part of the area within said marginal springs, means suspending said surface from all of said marginal springs to uniformly distribute a load supported by said surface to said frame, said frame and marginal springs being uniformly deflected inward and downward from all sides upon downward deflection of said surface, the upholstering for said spring structure being directly superimposed upon said surface.

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