July 25, 1961 M. J. RYMLAND 2,993,215

SPRING CUSHION ASSEMBLY

Filed July 9, 1956

Fig. 1.

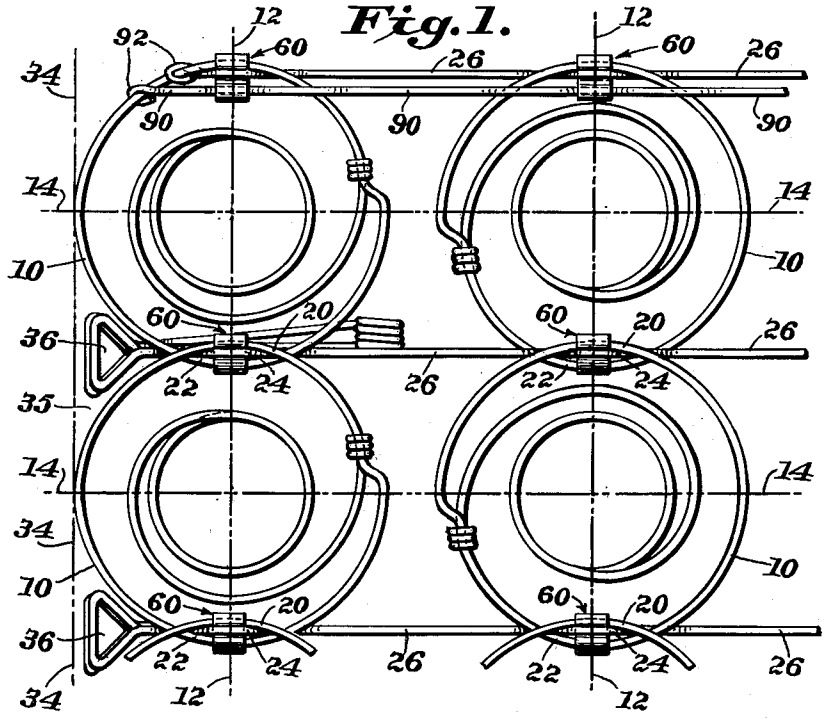


Fig. 2.

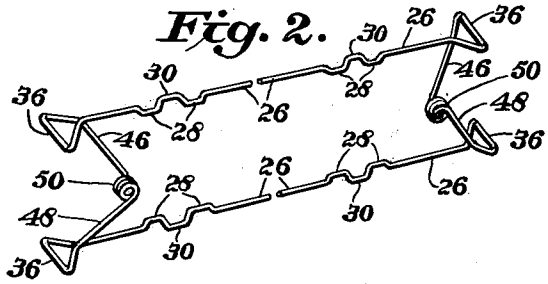


Fig. 3.

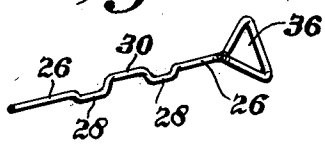


Fig. 4.

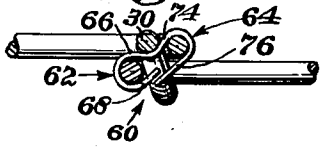


Fig. 5.

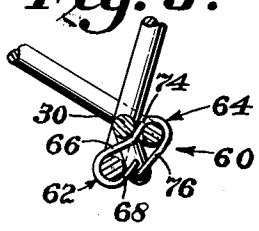
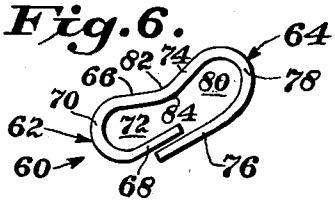


Fig. 6.



INVENTOR:

Murray J. Rymland,

BY Cushman, Darby & Cushman

ATTORNEYS.

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SPRING CUSHION ASSEMBLY

Murray Jerome Rymland, 2700 Hollins Road, Baltimore 30, Md.

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4 Claims. (Cl. 5—270)

This invention relates in general to spring cushion assemblies of the type described in my prior Patent No. 2,630,586, granted March 10, 1953, and in my copending applications, Serial No. 384,874, filed October 8, 1953, now Patent No. 2,791,783, issued May 14, 1957, and Serial No. 495,309, filed March 18, 1955, now Patent No. 2,857,603, issued October 28, 1958. More particularly, this invention relates to a novel means for interconnecting a plurality of helical coil springs in rows and files to define a spring cushion assembly.

In my prior patent, identified above, a spring assembly was disclosed having a clip structure for interconnecting corresponding portions of overlapping end convolutions of adjacent springs in the same row with tie wires so that no relative movement or displacement was permitted either between the overlapping end convolutions and the associated clip or between the overlapping convolutions themselves. That is to say, the overlapping convolutions and associated clip were connected together so tightly and firmly that movement of any one caused a corresponding movement of the others. This arrangement resulted in a spring cushion assembly wherein weight depressions were distributed proportionately throughout the entire spring assembly.

Such a rigid connection between the overlapping convolutions and clips will prevent the spring cushion assembly from being folded or collapsed along the axis of one of its tie wires. While in some spring cushion assemblies such folding is neither desired nor necessary, it is of considerable importance when the spring cushion assembly is used in a bed mattress or the like which is intended to be folded or collapsed when not in use.

Accordingly, it is an important object of this invention to provide a spring cushion assembly that may be folded or collapsed for facilitating the handling and storing of such assemblies. A related object is to provide a novel clip structure constituting a hinge-type connection for adjacent spring coils in the same row of the spring assembly to make the assembly foldable without sacrificing the weight distributing advantages afforded by a rigid connection such as the one in my prior patent.

It is another object of this invention to provide a durable and relatively strong spring cushion assembly which is very responsive to body weight and similar loads applied thereto, making the assembly extremely "soft" and comfortable.

A further object is to provide a spring cushion assembly that is particularly well adapted to withstand repeated distortions around its border or perimeter caused by locally applied forces and also to provide an assembly of simplified and inexpensive construction having means at its border strengthening the same and materially reducing the tendency of the assembly to undergo permanent and unsightly distortions in its border regions.

An additional object is to provide a novel border means for the spring assembly to prevent padding or filling material normally used in covering the springs, from entering into the component springs of the assembly by passage through the voids or cleavages between the springs in outside or border rows and files.

It is a still further object of this invention to provide a spring cushion assembly with a novel border structure at the end files of springs for readily interconnecting these springs and for providing a means to which the fabric covering for the assembly may be attached.

Further objects of this invention will be in part obvious and in part pointed out hereinafter.

The invention and the novel features thereof may best be made clear from the following description and the accompanying drawings, in which:

FIGURE 1 is a fragmentary top plan view of a spring cushion assembly constituting a preferred embodiment of this invention;

FIGURE 2 is a perspective view of one form of tie wire, partially cut away;

FIGURE 3 is a fragmentary perspective view of another form of tie wire;

FIGURE 4 is an enlarged, fragmentary, elevational view, partly in section, of the construction of the connection between overlapping end convolutions of adjacent springs;

FIGURE 5 is a view corresponding to FIGURE 4 but showing the overlapping end convolutions displaced or pivoted from their normal, substantially coplanar position;

FIGURE 6 is an enlarged end elevational view of a preferred form of the clip or clamp member, per se, after it has been connected in the spring assembly.

Referring to the drawings in detail, the spring cushion assembly constituting a preferred embodiment of my invention, comprises a plurality of component helical coil springs **10**, constructed of wire in a conventional manner, as illustrated in FIGURE 1. The springs are arranged in rows **12** and files **14**, and each row of springs is aligned and arranged with an arcuate portion of the upper and lower end convolutions of each spring overlapping a corresponding portion of an adjacent spring in the same row, whereby one such portion becomes an overlying arcuate portion **20** and the other becomes an underlying arcuate portion **22**, and a space **24** is provided between the overlapped portions.

To fix adjacent rows in the desired parallel spaced relationship, and to insure that the corresponding springs of adjacent rows are properly arranged in files **14**, a plurality of tie wires **26** extend transversely of the rows, parallel to the files **14**, and along the lines of overlap of the coils; that is, along the lines of overlap between the files. As shown in FIGURES 2 and 3, each tie wire **26** is provided with a plurality of pairs of spaced depressions **28**, each pair of spaced depressions being separated by an upwardly projecting insert **30** therebetween. When positioned in the assembly, each pair of depressions **28** partially embraces an intersecting section of an overlapping pair of arcuate portions **20**, **22** and the intermediate insert **30** projects into the space **24** therebetween. As will be readily understood, the pair of depressions **28** are spaced along the length of the tie wires **26** to suitably space adjacent rows **12** of component springs from each other, the structure illustrated in FIGURE 1 merely being a partial view of two spring rows **12** and two spring files **14** of the overall assembly.

The present invention contemplates the employment of a clip or clamp member **60** for interfitting the tie wires **26** with adjacent overlapping springs **10** and also for interconnecting the end convolutions of the springs **10**. A preferred embodiment of clip **60** is best seen in FIGURE 6, and it includes transversely spaced portions **62**, **64**. Portion **62** comprises spaced legs **66**, **68** joined by a bight portion **70** to define an inner groove **72**. The portion **64** also includes spaced legs **74**, **76** joined by a bight portion **78** to define another inner groove **80** in the clip structure, which is parallel to the first groove **72**. These grooves receive adjacent overlapping arcuate portions of end convolutions of the springs **10** for interconnecting the latter. A depressed portion **82** is formed in the clip **60** and defines an inner ridge **84** intermediate the parallel grooves **72**, **80**. The depressed portion **82** joins adjacent legs **66**,

74 of the spaced portions 62, 64 while the other legs 68, 76 of these portions are arranged in overlapping relationship to completely enclose the arcuate portions of the end convolutions within the clip 60, as best seen in FIGURES 4 and 5. In this connection it will be noted that the leg 76 is larger than the leg 68 extending thereover and slightly displaced therefrom. The depressed portion 82 is intended for engagement with the undersurface of a tie wire insert portion 30.

An important feature of this invention resides in the relationship of the size of clip grooves 72, 80 to the diameter of the wire in the springs 10. In my prior patent, the clip structure therein disclosed was intended to tightly and frictionally clasp the arcuate portions of corresponding end convolutions of adjacent springs in such a manner that virtually a unitary structure resulted. This structure prevented any relative sliding or pivotal displacement between the adjacent end convolutions and the clip, or between the adjacent end convolutions themselves so that downward pressures applied to one spring were transmitted proportionately to the other springs in the assembly.

It has been found that by enlarging the clip inner grooves a slight amount, the overlapping convolution portions will be loosely embraced by the clip portions 62, 64 so that they may relatively rotate within their respective clip grooves. However, if the clip grooves 72, 80 are not made too large it has been found that the resulting connection will still operate to transmit and distribute downward pressures applied to one spring substantially proportionately to the other springs in the assembly.

This pressure distribution is due to a considerable extent to inward forces exerted on the clips 60 by the tie wires. By inward forces I mean forces exerted on clip 60 in an inward direction from the spring end convolutions and substantially parallel to the spring axes. These inward forces are produced by proper vertical spacing between tie wire depressions 28 and the tie wire inserts 30 (as seen in FIGURES 2 and 3). That is to say, since the depressions 28 embrace the underside of the overlapping spring convolutions, the tie wire insert 30 will be tensioned over the clip depressed portion 82 if it is vertically spaced closer to the tie wire depressions 28 than the clip depressed portion 82 when these parts are assembled as illustrated in FIGURE 4. This tensioning of the tie wire inserts 30 creates the inward forces on the clip 60 thereby causing corresponding inward forces on the overlapping convolutions in the clips, tending to make the connection rigid between the overlapping convolutions whereby downward pressures on any one spring will be transmitted or distributed to other springs in the assembly. Moreover, this inward force obviously can be increased by reducing the vertical distance between the tie wire depressions and inserts.

The transverse dimension of the base or bottom of inner grooves 72, 80, preferably is at least as large as the diameter of the wire in the spring convolutions, while the overlapping legs 68, 76 are slightly displaced from each other and are not pressed or clinched tightly against the arcuate portions of the overlapping end convolutions. By virtue of this construction, the clip 60 of the present invention permits a hinging action on the part of the adjacent overlapping end convolutions (see FIGURE 5) so that when the whole assembly is constructed with these clips, an entire file 14 of springs 10 may be pivoted or swung simultaneously with respect to an adjacent file 14 of springs. The planes of the individual end convolutions of the springs in the middle adjacent files of the assembly may be pivoted towards each other through substantially a 90° angle to fold the assembly in half. During such pivoting or swinging, the clips 60 on the fold line will undergo a small counterclockwise movement as viewed in FIGURES 4 and 5.

This hinging or swinging action between adjacent files 14 of springs 10 will render the entire spring assembly flexible along axes parallel to the center lines of the files 14 whereby the spring cushion assembly may be folded or collapsed into a less unwieldy and more compact unit facilitating the handling or storing thereof.

Additionally, because of the limited freedom of movement of the overlapping convolutions in their respective clip grooves, the entire assembly is rendered more responsive to compressive loads or forces applied thereto than other spring assemblies having rigid connections between adjacent springs. Consequently, a softer and more comfortable assembly is produced.

It will be thus apparent that the structure of the clip 60 permits the manufacture of a spring cushion assembly having the desirable characteristics of a rigidly connected assembly, combined with the characteristics of being collapsible and extremely soft and comfortable.

The ends of the tie wires 26 preferably are formed in the same manner as the tie wires described in my prior application, Serial No. 495,309, mentioned above. That is, the tie wires 26 extend outwardly beyond the overlap of the outside row 12 and are then transversely bent to define a plane 36 which is substantially coplanar with the planes defined by the convolutions of the coils 10, being disposed in the cleavage 35 defined by adjacent end portions of the end convolutions of the coil springs and the edge line 34 (the later being shown as a phantom line). In defining the plane 36, the ends of the tie wires preferably are bent into a triangular or delta shape or any other convenient polygonal shape. The tie wires 26 connecting the upper end convolutions of the springs 10, may be separate from the tie wires connecting the bottom end convolutions of the springs (as in FIGURE 3) or they may be integrally connected thereto by means of a sear spring having two sear legs 46, 48 tangentially joined to a suitable coil spring 50 (as in FIGURE 2).

A border structure preferably including a straight wire 90, (see FIGURE 1), arranged in combination with a tie wire 26 and clips 60, is utilized for interconnecting the laterally outermost portions of the end convolutions of the springs, in the end files. The clips 60 are fitted over the laterally outermost portions of end convolutions of springs in an end file, the arcuate convolution portion being fitted into clip groove 72, with the other clip groove 80 disposed radially inwardly from the convolution and both clip grooves facing inwardly of the spring.

The depressed portions 28 on the tie wire 26 are disposed in embracing relation with the axially inward surface of the end convolutions with the insert portion 30 of the tie wire disposed in the depressed portion 82 of the clip. The border wire 90 is preferably more flexible than the tie wires and extends on the other side of the end convolutions and radially inwardly from the depressed portions 28 of the tie wire. Border wire 90 is flexed downwardly to extend through each of the clip grooves 80 thereby forming an interlaced and interlocked connection with the tie wire and end convolutions of the springs in the end files. The ends of border wire 90 and its associated tie wire 26 may be reversely bent inwardly to form loops or eyes 92 as shown, to eliminate any undesirable sharp edges at these points.

While not shown, a similar border structure to that described immediately above will be provided for the opposite end file of the spring assembly. These border structures cooperate with the planes 36 on the ends of tie wires 26 at the extremities of rows 12 to strengthen the border rows and files of the assembly for resisting permanent and unsightly distortion of the springs 10 therein. Additionally, these edge structures prevent the fabric covering and the padding around the spring assembly from dropping through the cleavages 35 thereby enabling the fabric covering to retain its shape in these regions and not sag or get lumpy. The border wire 90 and its associated tie wire 26 also present a means to which the fabric covering for the spring assembly may be secured.

Border wires 90 may be connected, as described, to

both the bottom as well as the top convolutions of the springs in the end files and, although not preferred, they may also be connected to the end convolutions in the extreme or exterior rows of springs. In the latter case, the tie wires **26** would not be provided with the planar ends **36** but would terminate short of the edge line **34**.

While the described arrangement of the border wires **90** with a tie wire and clips permits their attachment to the spring assembly to be performed rapidly and inexpensively, these border wires may be used by themselves and welded or otherwise connected to the end convolutions in the border of the assembly.

Variations in the structure of the clip **60**, within the scope of this invention, will readily suggest themselves to those skilled in the art, such as changing the shape of the depressed portion **82** or shortening or lengthening the legs **68**, **76**.

It will thus be seen that there has been provided, by this invention, an improved spring cushion assembly in which the various objects hereinabove set forth, together with many practical advantages are successfully achieved. As various possible embodiments may be made of the mechanical features of the present invention, such as those mentioned, all without departing from the scope thereof, it is to be understood that all matter hereinbefore set forth or shown in the accompanying drawing is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. A spring cushion assembly comprising a plurality of parallel rows and parallel files of similar helical coil springs, said springs being interconnected with their axes arranged in parallelism, means for interconnecting the laterally outermost arcuate portions of end convolutions of the springs in the end files, said means including a tie wire extending parallel to the files and having a plurality of pairs of spaced depressions with upwardly projecting offset inserts therebetween, the depressions of each pair being disposed in embracing relation to one of said arcuate portions at circumferentially spaced points on one side thereof, with the intermediate offset insert projecting away from said points, a flexible wire arranged parallel to and coextensive with said tie wire, said flexible wire being disposed on the other side of said arcuate portions, and means for interconnecting said arcuate portions with said flexible wire and with said tie wire offset inserts to retain said wires in assembled relation engaged to opposite sides of said arcuate portions.

2. The structure defined in claim 1 wherein the interconnecting means comprises a clip having two parallel inner grooves and an outer groove formed intermediate said inner grooves, said inner grooves receiving the arcuate portion and the flexible wire respectively and the tie wire offset insert being disposed in said outer groove.

3. A spring cushion assembly of generally rectangular outline comprising a plurality of parallel rows and parallel files of similar helical coil springs having their axes arranged in parallelism, each spring having an arcuate portion of an end convolution thereof so overlapping a corresponding convolution portion of an adjacent spring in the same row as to provide a space between such overlapping portions, a plurality of parallel tie wires extending transversely of the rows and each tie wire having a plurality of pairs of spaced depressions with upwardly projecting offset inserts therebetween, the depressions of each pair being disposed in embracing relation to the overlapping points of a pair of adjacent arcuate spring portions with the intermediate offset insert projecting into the space between said arcuate portions, a hinge means underlying the projecting offset insert of the tie wire and interconnecting the overlapping arcuate portions of each adjacent pair of end convolutions whereby any file of said springs may be swung with respect to an adjacent file of said springs, each of the tie wires extending beyond the overlap of an exterior row of springs into the exterior cleavage defined by the end portions of the overlapping convolutions, said tie wires having a planar edge support means of generally polygonal shape at the ends thereof and disposed within said cleavages so as not to interfere with the swinging of said files of springs, said planar edge support means at the ends of said tie wires defining lines of border support along the two border sides perpendicular to said files without interfering with the ability of the files of springs to be swung with respect to adjacent files, and separate, elongated border support means interconnected to the springs in each of the two border files of springs and providing lines of support along the two border sides parallel to the files of springs.

4. The structure defined in claim 3 wherein said elongated border support means includes a pair of parallel and adjacent wires extending parallel to and substantially coextensive with each of the two border files of springs, said parallel wires being engaged to the end convolutions of said springs in said border files and on opposite sides of said last-named end convolutions, and clip means interlaced with said parallel wires and said last-named end convolutions and holding said parallel wires in engagement with said end convolutions.

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