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WIRE SPRING STRUCTURE

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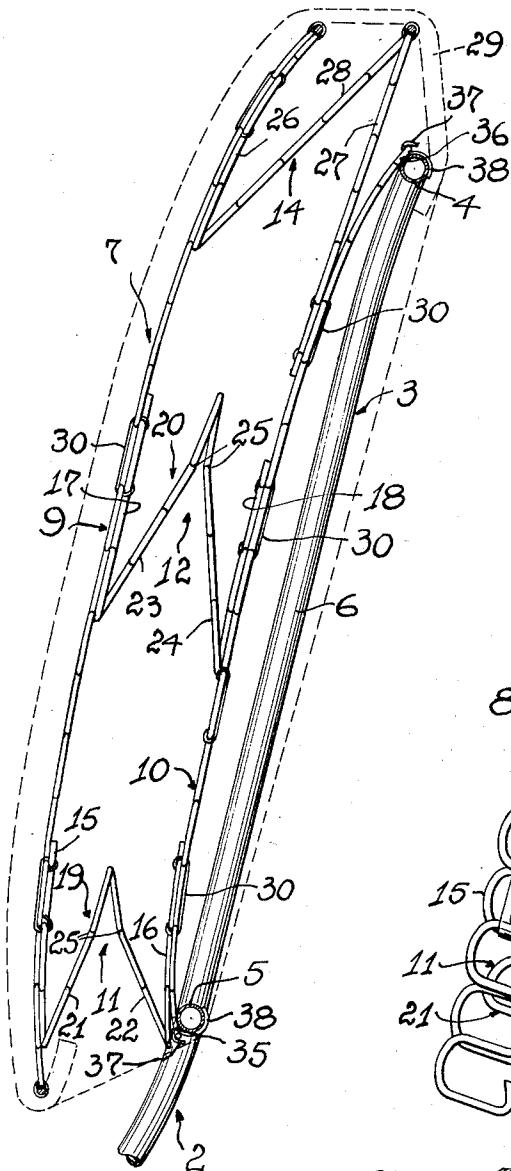


FIG. 1

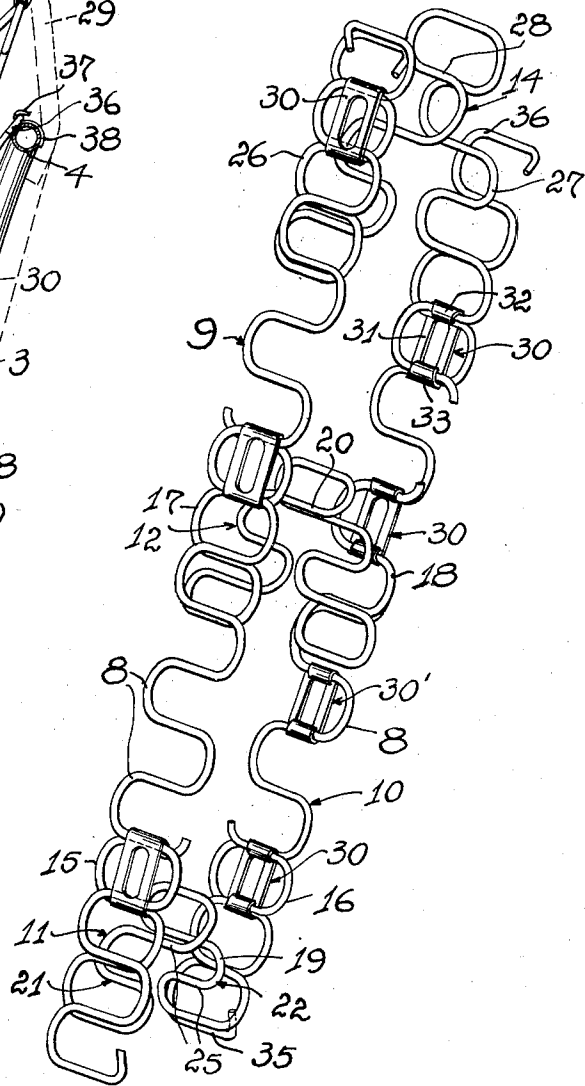


FIG. 2

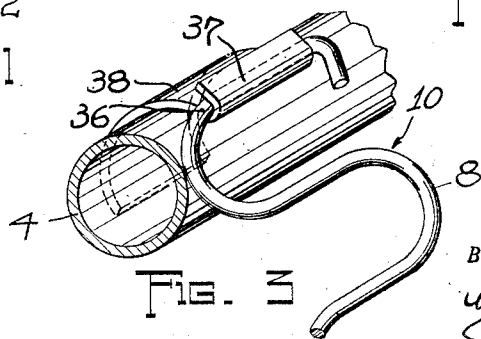


FIG. 3

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WIRE SPRING STRUCTURE

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The present invention relates to improvements in upholstered seat and back spring constructions and has particular reference to upholstered spring constructions for vehicles and furniture.

Spring constructions of this type should be soft and yielding, of sufficient resistance to extreme deflection, of minimum thickness while giving the feel of considerable depth, low in weight and economical in manufacture.

The principal object of this invention is the provision of a spring structure to be used in upholstered spring constructions, which structure includes sinuously corrugated, spaced, elongated wire elements, and sinuously corrugated wire spacing members interposed between and rigidly attached to the wire elements by clips connecting the wire spacing members with the wire elements at spaced points and effecting stiffening of the wire elements by decreasing their axial yield.

Another object of the invention is the provision of a spring structure to be used in upholstered spring construction which is assembled from sinuously corrugated, spaced, elongated wire elements, and sinuously corrugated wire spacing members of zigzag configuration including sharp-edged apexes at their bends, the wire spacing members being interposed between the wire elements and rigidly attached thereto by clips connecting the spring members to the wire elements at spaced points and effecting stiffening of the wire elements by decreasing their axial yield.

A further object of the invention is the provision of a spring structure for spring constructions which is assembled from sinuously corrugated, spaced, elongated wire elements, and sinuously corrugated, wire spacing members interposed between the wire elements and rigidly attached thereto by clip means connecting the wire spacing members with the wire elements at spaced points, and which embodies in one of the wire elements means to additionally decrease the axial yield of such wire element to effect an increase in the resistance of such wire element against tensile stresses.

In addition, the invention has other marked improvements and superiorities which radically distinguish it from presently known structures. These improvements or superior characteristics embodying certain novel features of construction are clearly set forth in the appended claims, and a preferred embodiment of the invention is hereinafter shown with reference to the accompanying drawing forming part of the specification.

In the drawing:

Fig. 1 is a sectional view through a tubular frame mounting a spring construction assembled from spring structures made in accordance with this invention.

Fig. 2 is a perspective view of a spring structure used in a spring construction such as shown in Fig. 1; and

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Fig. 3 is an enlarged perspective, fragmentary view showing the rear wire element of a spring structure attached to the top rail of a tubular frame.

Referring now in detail to the exemplified form of the seat structure shown in the drawing, reference numeral 2 represents a sectionally and fragmentarily shown seat frame structure of an automobile, the back frame 3 of which has substantially rectangularly shaped open form. Back frame 3 is made of steel tubing and includes a top rail 4, a bottom rail 5 and side rails 6. The top and bottom rails 4 and 5 support a plurality of elongated corrugated wire spring structures 7 which bridge the back frame and are attached to rails 4 and 5 in a manner hereinafter to be described.

Each of the elongated, corrugated wire spring structures, assembled from corrugated wire members are made of steel wire bent to sinuous shape so that their loops 8 extend substantially parallel to each other. These spring structures each embody an elongated top wire member 9, an elongated base wire member 10 shorter in length than the top wire member, and connecting spacing members 11, 12 and 14 of zigzag configuration rigidly attached to the top and base wire members 9 and 10 as will be described hereinafter. The spring members 11 and 12 are M-shaped and each includes substantially parallel yielding top and bottom portions 15, 16 and 17, 18 respectively, yieldingly spaced from each other by V-shaped spacer and supporting portions 19 and 20 respectively. The V-shaped spacer and supporting portion 19 of spacing member 11 has arms 21 and 22 of a length equal to three wire loops 8 and the V-shaped spacer and supporting portion 20 of spacing member 12 has arms 23 and 24 of a length equal to four wire loops 8, so that wire spring structure 7 has higher compression resistance in its lower area than in its central area. The arms 21 and 22 of supporting portion 19 and the arms 23 and 24 of supporting portion 20 are additionally bent in definite areas between their opposite ends as at 25 to reduce the angle between the respective arms and facilitate bending of these arms under excessive loads without interference between the arms. Spacing member 14 is Z-shaped and includes substantially parallel, yielding top and bottom portions 26 and 27 which are yieldingly spaced from each other by an inclined spacer and supporting arm 28. The top portion 26 of member 14 has a length equal to four wire loops 8, spacer arm 28 a length equal to five wire loops 8 and bottom portion 27 a length equal to six wire loops. The difference in length between the different parts of spacing member 14 permits additional support for padding material 29 which covers all the spring structures of the seat structure.

The top and base wire members 9 and 10 of

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spring structure 7 are secured to spacing members 11, 12 and 14 by sheet metal clips 30, each of which includes a perforated body 31 and oppositely arranged ear portions 32 and 33 extended from body 31 and wrapped around the respective straight portions of the wire members connecting adjoining loops 8 thereof. These clips are dimensioned to bridge one of the loops 8 and to wrap their ear portions around superposed adjoining straight portions of the members. When thus applied to the top and base wire members 9 and 10, and spacing members 11, 12 and 14, clips 30 effect a reduction in the axial yieldable length of the top and base members as the bridged loops thereof cannot axially yield.

The assembly of the spring structures 7 affects their axial yield and stiffness and facilitates proper bridging of excessively wide frame structures by the spring structures. Preferably the base wire member 10 is of less axial yieldability than the top member 9 to provide sufficient support for the central portion of spring structure 7 when secured to opposed rails of the frame by the end portions 35 and 36 of base wire member 10. A further decrease in the yieldability of base wire member 10 is effected by an additional sheet metal clip 30' stiffening an additional loop 8 of the base wire member.

Wire spring structures 7 are secured to top and bottom rails 4 and 5 by forcing the open loops of the end portions 35 and 36 of the base wire member on hook-shaped end portions 37 of bracket members 38 preferably welded to rails 4 and 5. The distance between the end portions of opposed bracket members is greater than the length of the base wire member to effect tensile stresses therein. Bracket members 38 are positioned to effect outward bulging of the base wire member by its contact with the rails of the frame when such wire member is secured to the end portions of opposed bracket members.

The wire spring structure 7 offers its greatest resistance against compression in its lower area and thus affords proper support for the back of a person resting thereagainst. The central and upper areas of wire spring structures 7 are softer due to the increased length of the arms of their V-shaped supporting member 12 and the further increased length of the inclined arm of the Z-shaped supporting member 14.

Having thus described my invention, what I claim is:

1. A wire spring structure for spring constructions comprising oppositely arranged, elongated, sinuously corrugated wire members, and a plurality of corrugated wire elements of zigzag configuration to form said elements with V-shaped arms, said elements being interposed between and rigidly attached with the free end portions of its arms to the said sinuously corrugated wire members for yieldingly connecting same in spaced relation with respect to each other.

2. A wire spring structure for spring constructions comprising oppositely arranged, elongated, sinuously corrugated wire members forming top and base members of the wire spring structures, a plurality of sinuously corrugated wire elements of zigzag configuration to form said elements with V-shaped arms, said elements being arranged between said wire members and coupling same in spaced relation with respect to each other, said wire elements having the free end portions of their arms arranged sub-

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stantially parallel to each other, and clip members rigidly connecting said end portions at spaced points to said wire members.

3. A wire spring structure for spring constructions comprising substantially straight, oppositely arranged, elongated, sinuously corrugated wire members with loops connected with each other by straight wire portions, corrugated wire elements of zigzag configuration arranged between said wire members for yieldingly spacing same and clip means coupling said wire members with said wire elements, said wire elements including V-shaped arms and the arms of different elements being of different length to differentiate the action of different wire elements under load.

4. A wire spring structure for spring constructions comprising substantially straight, oppositely arranged, elongated, sinuously corrugated wire members having loops connected by straight wire portions, corrugated wire elements of M-shaped configuration, and a corrugated wire element of Z-shaped configuration, said corrugated wire elements being interposed between said wire members and clip means rigidly securing said wire elements to said wire members.

5. A wire spring structure for spring constructions comprising substantially straight, spaced, oppositely arranged, elongated, sinuously corrugated wire members having their corrugations formed by loops connected by straight wire portions, a plurality of corrugated wire elements of M-shaped configuration and a corrugated wire element of Z-shaped configuration, said wire elements being interposed between said wire members and rigidly secured thereto at spaced points of said members, and said wire elements differentiating in load carrying ability to provide a wire spring structure having different load carrying properties in different areas.

6. A wire spring structure for spring constructions comprising substantially straight, spaced, oppositely arranged, elongated, sinuously corrugated wire members having corrugations formed by loops connected by straight wire portions, a plurality of corrugated wire elements of M-shaped configuration interposed between said wire members, said wire elements including V-shaped arms and the arms of different elements being of different length to differentiate the action of different wire elements under load, and clip members rigidly connecting said wire members with said wire elements, each of said clip members being dimensioned to rigidly connect two adjacent straight wire portions of said corrugated wire members to decrease the axial yield of these wire members.

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