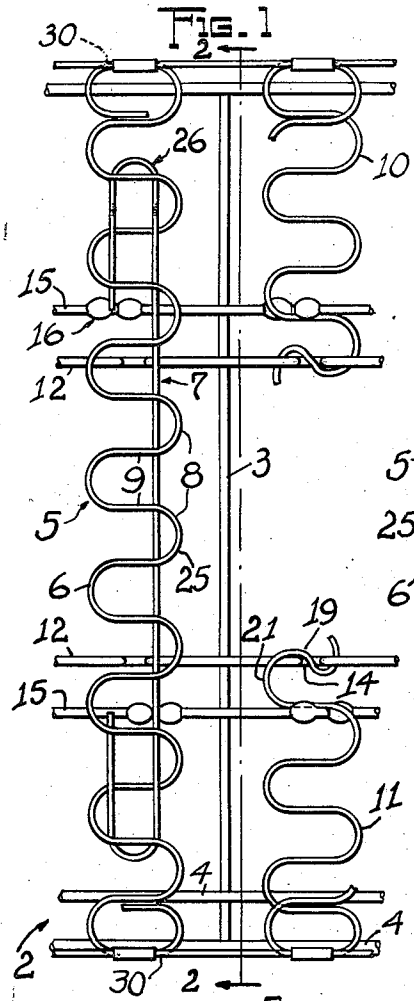
Oct. 14, 1958 W. H. NEELY 2,855,985

WIRE SPRING STRUCTURE

Filed Feb. 25, 1957

Fig. 1



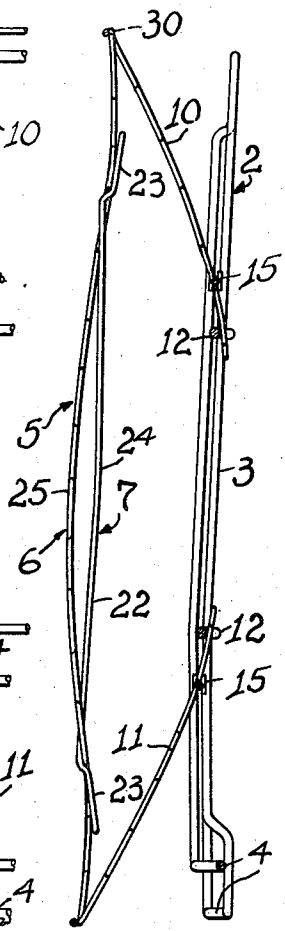


Fig. 2

Fig. 3

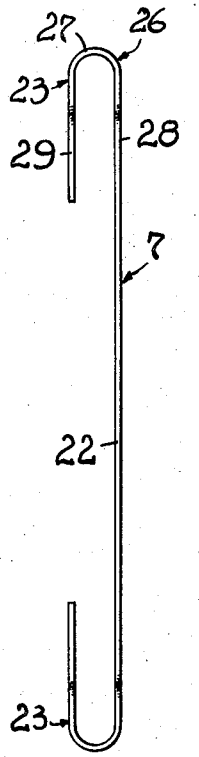
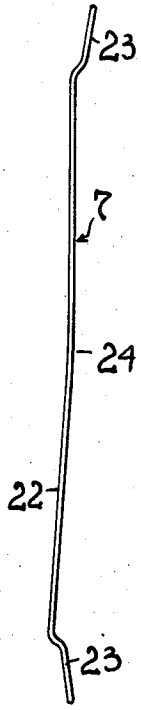


Fig. 4



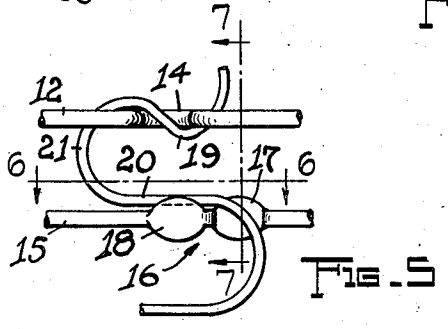


Fig. 5

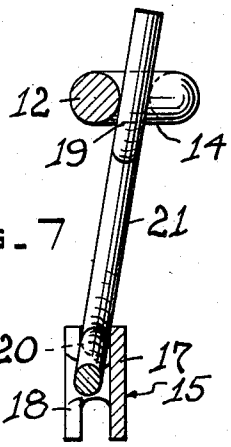


Fig. 7

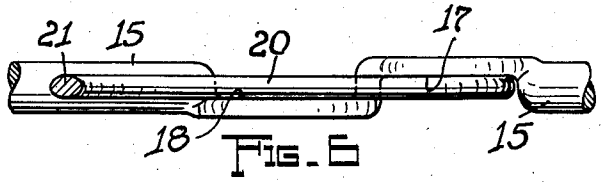


Fig. 6

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WIRE SPRING STRUCTURE

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Application February 25, 1957, Serial No. 642,009

4 Claims. (Cl. 155—179)

This invention relates to improvements in upholstered seat and back spring constructions assembled from sinuous or zigzag-shaped wire springs which are individually reenforced by auxiliary wire spring members to contour-shape the wire springs, increase their yielding resistance and provide improved support for and conformation to the human body.

Spring constructions of the type indicated generally embody reenforced sinuous wire springs having elongated webs and supporting arms extended from opposite ends of the webs, and these wire springs are reenforced by auxiliary sinuous wire spring sections or substantially straight bracing rods pivoted to intermediate areas of the webs and the supporting arms. However, reenforced wire springs of these spring constructions have substantial height and therefore can hardly be used for seat and back spring constructions in present day height-reduced automobiles in which space available for seat and back structures is limited.

The primary object of the present invention is the provision of an improved seat and back spring construction assembled from reenforced zigzag-shaped wire spring structures with wire springs each of which includes an elongated wire with a web reenforced by an auxiliary wire member having its ends in cantilever-like fashion attached to spaced areas of the web and its middle portion spaced from the web to decrease the height of the wire spring structure while retaining its contour and yielding resistance, thus permitting use of the wire spring construction in present day height-reduced automobiles.

In these wire spring structures, the ends of the web-reenforcing auxiliary wire members are coupled in cantilever-like fashion with the wire spring webs by interlacing these ends with at least two adjoining cross wire members of the webs and the middle portions of the auxiliary wire members are spaced from these webs preferably by bending these middle portions in a direction away from the webs.

Another object of the invention therefore is the provision of an improved wire spring structure of the type above referred to in which the auxiliary wire member has its ends interlaced with at least two adjoining cross wire members of the web of the wire spring and in which the middle portion of the auxiliary wire member is bent in a direction away from the web of the wire spring.

Further objects of the invention lie in shape and form of the auxiliary wire member constructed to include a somewhat V-shaped middle portion and axially offset end portions facilitating their interlacing with cross members of the web of zigzag-shaped wire springs.

Still other objects of the invention lie in the specific construction of reenforced wire spring structures of the type referred to and their removable mounting on wire frame structures permitting full compression of loaded reenforced wire spring structures without danger of noisy wire entanglement and impediment of the proper action of the reenforced wire spring structures.

In addition to the above described objects, 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 described with reference to the accompanying drawing forming part of the specification.

In the drawing:

Fig. 1 is a fragmentary plan view of a spring construction assembled of wire spring structures embodying zigzag-shaped wire springs reenforced by auxiliary wire members constructed in accordance with the invention.

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

Fig. 3 is a plan view of one of the auxiliary wire members shown in Fig. 1.

Fig. 4 is a side view of Fig. 3.

Fig. 5 is an enlarged fragmentary plan view of a wire spring showing the interlacing seating and holding connection of the wire spring with the wire frame.

Fig. 6 is a sectional view taken on line 6—6 of Fig. 5; and

Fig. 7 is a sectional view taken on line 7—7 of Fig. 5.

Referring now more particularly to the exemplified form of the invention, the seat back spring structure shown for illustration, which is especially adapted for automobile seat back constructions, embodies a frame structure 2 formed by wire stringers 3 and pairs of parallelly arranged cross wire members 4 arranged in spaced areas of frame structure 2. Cross wire members 4 are extended crosswise of wire stringers 3 and welded thereto at contact points therewith. Frame structure 2 removably supports on its cross wire members 4 a plurality of wire spring structures 5, each of which includes a sinuously corrugated wire spring 6 and a reenforcing auxiliary wire member 7. Each wire spring 6 embodies oppositely extended loops 8 which are connected by substantially parallel cross members 9 and sinuously corrugated wire supporting arms 10 and 11 adapted to removably attach the wire spring to spaced pairs of cross wire members 4 of frame structure 2. To this end, the pairs of cross wire members 4 each include one cross wire member 12 with a plurality of laterally spaced, sharply bent open loops 14 and another cross wire member 15 with a plurality of seating and holding sections 16 which are formed by flattening the cross wire member in opposite directions and provide axially offset, oppositely arranged seating and holding portions 17 and 18. Loops 14 in cross wire member 12 are aligned with seating and holding portions 17 and 18 in cross wire member 15 for cooperation therewith in seating and holding the supporting arms 10 and 11 which are attached to pairs of cross wire members 4 by threading S-shaped end cross member 19 of the supporting arms through sharply bent open loops 14 and springing end cross members 20, which adjoin end cross members 19, to positions adjacent and parallel to cross wire members 15. This assembly effects seating of cross members 20 on seating portions 17 and holding of cross members 20 by holding portions 18 (see Figs. 6 and 7). Supporting arms 10 and 11 are yieldingly held in attached position by yielding end loops 21 which are slightly compressed when the supporting arms are mounted in the manner described.

The sinuously corrugated reenforced wire spring structure 5, which permits reduction in height without loss in control of contour-shape and load resistance, have the wire springs 6 reenforced by elongated auxiliary wire members 7, each of which includes an elongated body portion 22 and axially offset end portions 23. Body portion 22 is centrally bent at 24 to prevent its contact with the elongated web 25 of wire springs 6. The end portions 23 of auxiliary wire member 7 are offset to

facilitate their interlacing with adjoining parallel cross members **9** of wire spring **6** for cantilever-like coupling of these end portions with spaced areas of web **25** of wire spring **6**. End portions **23** are preferably U-shaped as at **26** and have the web portions **27** of their U's curved to stiffen same and effect cooperation of arms **28**, **29** of the U's in the engagement of such arms with cross members **9** of web **25**.

When loaded, seat and back spring constructions of this type resist with increasing stiffness to the load, as the beam strength of webs **25** of the wire spring structures **5** by cantilever-like engagement of webs **25** with end portions **23** of auxiliary wire members **7** is increased. Such increased stiffness of the webs permits their shaping to the human body without formation of soft spots and bulges as the load is transferred through auxiliary wire members **7** to the coupling areas of auxiliary wire members **7** and webs **25** to cross wire members **30** at the ends of the webs and resisted by torsional twisting of cross wire members **30**.

Wire spring structures of the type described, which may be adapted to any and all desired load contours by change of the location of the coupling areas between webs **25** and auxiliary spring members **7** and by length and cross sections of such auxiliary spring members, can readily be fully compressed without danger of interlocking the cross members **20** of their supporting arms **10** and **11** with cross wire members **4** of frame structure **2**, as the seating and holding sections **16** of cross wire members **15** locate cross members **20** in the plane of frame structure **2** and substantially parallel to cross wire members **15**.

Having thus described my invention, what I claim is:

1. In a seat assembly, a spring seat construction embodying a frame and a plurality of wire spring seat structures mounted on said frame, said wire spring seat structures each including an elongated, sinuously corrugated resting portion formed by left and right-handed loops successively connected by straight wire cross portions and an elongated auxiliary wire member with a middle portion positioned below the resting portion in

axially spaced relation and end portions extended through the resting portion between adjacent wire cross portions thereof and interlaced therewith to effect cantilever-like couplings of the end portions of the auxiliary wire members with the sinuously corrugated resting portions of the wire spring seat structures when the resting portions are loaded.

2. A seat assembly as described in claim 1, wherein the end portions of the elongated auxiliary wire member are U-shaped and axially offset with respect to the middle portion thereof to contact the ends of the middle portion with the top face of the resting portion and the U-shaped ends of the auxiliary member with the bottom face of the resting portion.

3. A seat assembly as described in claim 1, wherein said elongated auxiliary wire member is shaped from straight wire and has a middle portion bent in a direction away from the bottom face of the sinuously corrugated resting portion of the wire spring seat structure.

4. In a reenforced spring structure a wire spring of sinuous wire having opposite arranged loops connected by short straight cross wire portions, said wire spring including an elongated resting portion and supporting arms extended from opposite ends thereof, and an elongated auxiliary wire member bent from straight wire including an elongated body and axially offset end portions, said auxiliary wire member having its body arranged below said resting portion in spaced relation with respect thereto and its axially offset end portions threaded through said resting portion between two cross wire portions and interlaced therewith to effect cantilever-like coupling of the auxiliary wire member with the resting portion of the wire spring.

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