Oct. 21, 1958 E. T. PAWLIKOWSKI 2,856,989

SPRING CUSHION CONSTRUCTION

Filed July 6, 1956 2 Sheets-Sheet 1

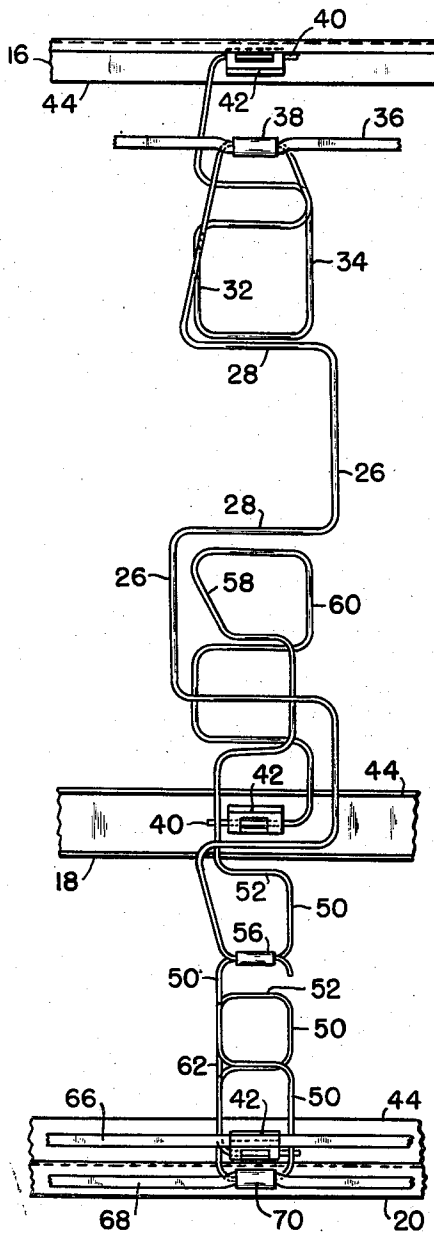


Fig. 2

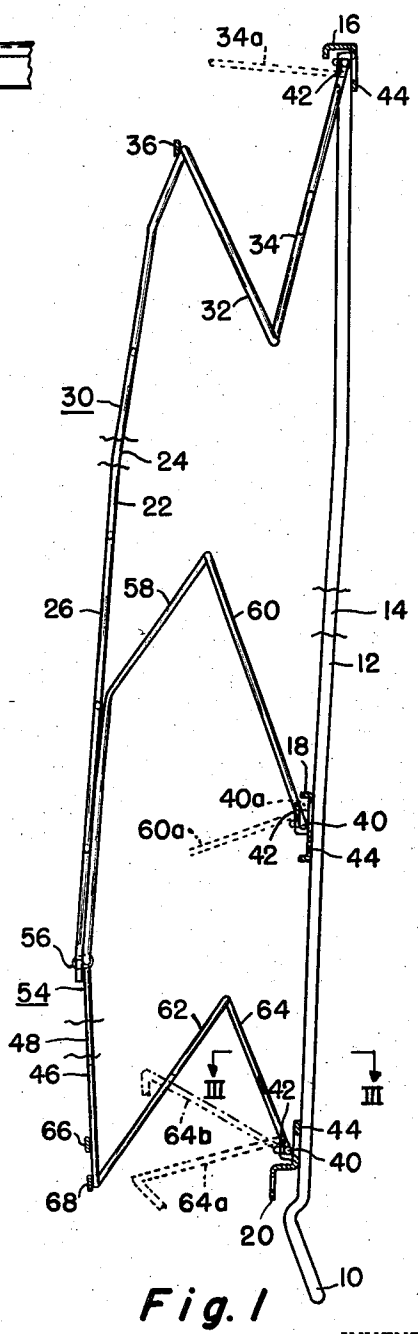


Fig. 1

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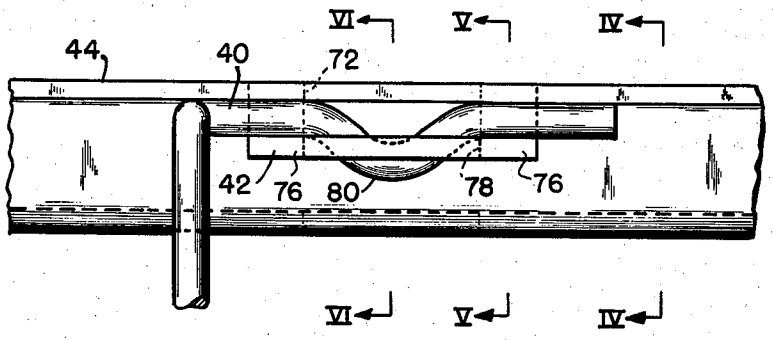


Fig. 3

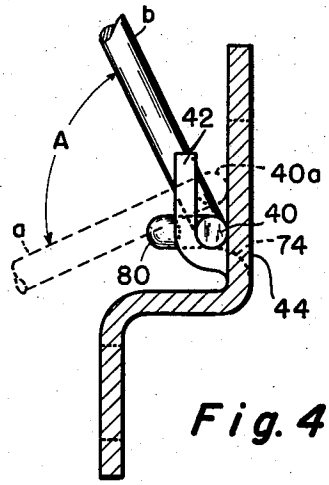


Fig. 4

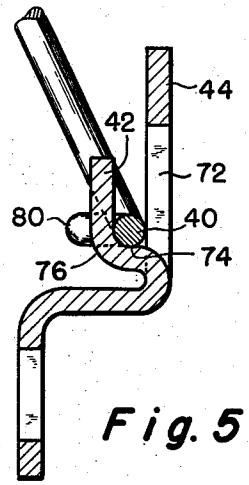


Fig. 5

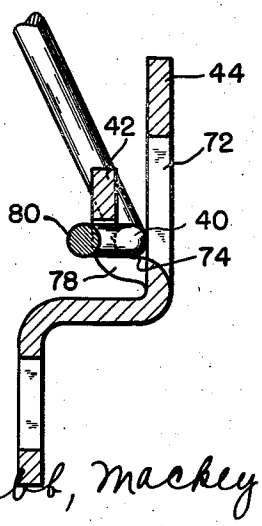


Fig. 6

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SPRING CUSHION CONSTRUCTION

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Application July 6, 1956, Serial No. 596,312

4 Claims. (Cl. 155—179)

The present invention relates in general to spring cushion constructions and more particularly to such constructions embodying wire spring strips with zigzag or sinuous web formation.

Spring cushion constructions of the type embodying the invention include a plurality of transversely spaced sinuous spring elements having load-carrying supported webs and being bent at the ends of the webs to provide web supporting portions which are attached at their extremities to a suitable frame. Heretofore these supporting portions have usually presented looped extremities each permanently secured at two or more spaced points to lugs on an adjacent frame member by means of a lug tool to make a rigid lug connection whereby that portion physically flexes adjacent the loop under load deflections as compared to pivoting or otherwise having some freedom of movement to adjust to and more smoothly react to the load. Detachment of those permanent connections for diassembly of the cushion has ordinarily required another tool to remove the rigidly held extremities of the spring supporting portions. The spring strips themselves have usually been of identical length and shape and the edges and ends of the webs thereof are interconnected by border wires which form the edges of the cushion.

According to the present invention, a pivoted type connection is provided between the terminals of the spring supporting portions and the adjacent frame member to permit rapid and easy assembling and disassembling of the springs while at the same time firmly locking the assembled springs against lateral and longitudinal movement when in place. In spite of the confining nature of this connection to prevent dislodgement, it nevertheless permits rotational freedom of movement in order that the supporting portion can pivot and enable the spring readily to adjust itself to load. The specific webbed spring elements according to a preferred embodiment of the invention are divided into two groups, the one being of a length substantially equal to, but slightly shorter than the width of the cushion and the other being considerably shorter than the first, but preferably defining one edge of the cushion. The longer elements define the opposite edge of the cushion and are connected so that one longer element is transversely and longitudinally aligned with a companion shorter element adjacent. Each companion two elements of the two groups have an overlapping portion at which they are connected presenting a common supporting area which is stiffer than their individual remaining areas inasmuch as the latter are constituted solely by the webs of the long springs only and by the webs of the short springs only. Further variation can be achieved by control of the formed wire embodied as the web in the spring elements and as a matter of fact the longer wire elements hereof are so arranged that they are more readily yieldable to loads placed thereon than the shorter wires.

The above indicated type of construction and pivoted end connection is particularly useful in back rest cushions where rapid assembly without tools is highly desirable

and where increased stiffness in certain areas of the assembled springs is desired. The preferable area of stiffness is in the upper portions of the small of the back of a seated person where both sets of elements commonly provide support, while immediately therebelow and also at the top, the back rest cushion is desirably softer, for instance, in the area of the shoulders of the occupant which sink into the cushion at a point where only the longer, relatively weaker elements provide support.

A preferred embodiment of the invention is hereinafter disclosed, with reference to the drawings accompanying and forming part of the specification.

In the drawings in general:

Figure 1 is a side elevation, with upholstery removed, showing a back rest cushion embodying the invention,

Figure 2 is a fragmentary plan view of the cushion of Figure 1,

Figure 3 is an enlarged detail view in elevation from the direction of the lines III—III of Figure 1, and

Figures 4, 5, and 6 are progressive cross sectional views to the scale of Figure 3 taken along the respective lines IV—IV, V—V, and VI—VI thereof.

In specific reference to the drawings, the back rest cushion of an automobile that has been selected to illustrate the principles of the invention has a heavy wire supporting-frame or base including a longitudinally extending bar **10** at the bottom having spaced side members **12** and **14** bent at right angles to the opposite ends of the bar **10**. A row of longitudinal sheet-metal structural members is provided consisting of a formed upper retainer **16**, a center retainer **18** and a lower retainer **20** having their opposite ends rigidly secured to the spaced side members **12** and **14**. A first group of strip spring elements **22**, **24** has webs with a formed wire construction consisting of edge spacer bars **26** joined at right angles to parallel cross bars **28** to form generally square shaped oppositely disposed right and left loops. The arrangement of this first group of elements **22**, **24** is in a row to define a cushion area generally indicated at **30** and at the edge of this area the elements are bent to define a rearwardly and downwardly extending supporting portion **32** and a rearwardly and upwardly extending supporting portion **34** which present a V-shape. A border wire **36** of slightly flattened cross section is secured at various points by means of an individual clip **38** to the elements in the cushion area **30** adjacent its juncture with the supporting portion **32**. The other supporting portion **34** terminates in a substantially straight cross bar **40** which is received in the crook of a formed lug **42** sheared out of a plane flange **44** on the upper retainer **16**.

A second group of strip spring elements **46**, **48** is made of similar formed wire bent back and forth to define a series of edge spacer bars **50** joined at right angles to parallel cross bars **52**.

The respective spacer bars **50** and the cross bars **52** are shorter in length than the corresponding edge spacer bars **26** and the cross bars **28** of the first group of elements and therefore the webs of these elements are somewhat stiffer. The second elements **46**, **48** define a resultingly stiffer cushion area **54** which intermediate its ends has a clip **56** securing it to a companion element of the first group in lateral and transverse alignment therewith. Immediately upwardly of the clips **56** the first and second groups of elements overlap to define a common cushion portion which is of course stiffer than the individual end cushion areas **30** and **54**. At its upper end, each element defining the cushion area **54** has a supporting portion **58** bent upwardly and rearwardly and joined to another supporting portion **60** bent downwardly and rearwardly to present a V-shape. The supporting portion **60** has a substantially straight cross bar **40** secured

to a lug 42 which extends from a plane flange 44 presented by the retainer 18.

At the lower end the second elements 46 and 48 each have a rearwardly and upwardly bent supporting portion 62 joined in V-shape to a rearwardly and downwardly bent supporting portion 64 which terminates in a substantially straight cross bar 40 connected between a lug 42 and a plane flange 44 on the lower retainer 20. Adjacent the juncture between the cushion area 54 and each of the bent supporting portions 62, the second wire elements 46, 48 are secured together by means of flattened border wires 66 and 68 which are closely spaced to one another and suitably secured to the wire elements by means of a set of appropriate clips 70.

Figures 3, 4, 5 and 6 illustrate the details of the connection between the cross bar portions 40 on the formed spring elements and the lugs 42 on the plane flanges 44 of the retainers. The lugs 42 are sheared upwardly out of the plane flange 44 so as to leave an unoccupied opening 72 of generally rectangular shape. This opening 72 is of substantial width and accordingly the lug 42 is of corresponding width as it is formed and it is thereafter bent longitudinally so as to provide a crook 74 in which the cross bar 40 is received to rotate. The width of the lug 42 prevents the cross bar 40 from twisting out of its coaxial relationship with the crook 74 in which it pivots. The lug is supported in a plane parallel but in offset relationship to the plane flange 44 by means of an integral pair of parallel leg portions 76 separated by a retention slot 78 coextensive in length with the bend of the crook 74. The cross bar 40 has a pair of axially aligned substantially straight end portions joined by a crimped intermediate section 80 defining a lateral bulge which protrudes outwardly at right angles to the plane flange 44 and through the window or opening defined by the retention slot 78. The straight end portions enable the cross bar 40 to rotate against the plane flange 44 as they occupy the crook 74 beneath the lug 42 but the cross bar 40 is prevented from dislodgement either axially of the crook 74 or transversely thereto by reason of engagement of the crimped intermediate section 80 with one end of the slot 78 and with the inner margins of the two leg portions 76 of the lug 42.

This localized connection which prevents freedom of movement except in the rotational sense is a pivotally made connection accomplished in accordance with Figure 4. In Figure 4, the supporting portion of each wire element is brought toward the lug 42 from an immediately adjacent position in the vicinity of the dotted lines *a*. In this position the cross bar 40 occupies the dotted line position 40*a* and it is thereafter slipped through the remaining part of the uniform width of space beneath the lug 42. The supporting portion is stopped due to bottoming against the part bearing surfaces presented by the concave bend in the legs 78 and is then rotated through the arc A approximately 90° to a point at which the adjacent spacer bar loop of the supporting portion occupies the solid line position *b*. In reaching this point the crimped section 80, best seen in Figure 6, will have entered and rotated approximately 90° in the retention slot 78 in the lug 42 and it will thereafter resist axial or transverse movement of the cross bar portion 40 relative to the crook 74 in the bend of the lug 42. Freedom of the section 80 to move in the lengthwise extending retention slot 78 and the consequent rotative movement of the entire cross bar 40 enables the supporting portion of the wire element to have substantial pivotal freedom both in a direction approaching its initially inserted position shown by the dotted lines *a* in Figure 4 and also in the opposite rotative direction toward the plane flange 44. As shown, the diagonal relationship of the adjacent spacer bar loop and the remainder of the supporting portion of the wire in normal position amounts to approximately 35° or less relative to the plane flange 44 to which it is secured.

In assembly of the wire elements according to preceding Figure 1, the second elements 46 and 48 are first arranged one at a time such that their end portions 64 occupy the dotted line position 64*a* relative to the lower retainer 44. As the individual cross bars 40 on these portions 64 are being inserted beneath the lugs 42, the elements are simultaneously being rotated clockwise as viewed in Figure 1 to a point at which the supporting portions 64 progress to the dotted line position 64*b*. At this point the supporting portions 60 at the upper end of the second elements are manually bowed into the shape indicated by the dotted lines 60*a* in Figure 1 at which point the cross bar 40 carried thereby occupies the dotted line position 40*a*. The cross bars thereafter are hooked under the adjacent lug 42 and the spring element is released to occupy its normal full line position shown in Figure 1. When so released by the assembler, the V-shaped supporting portions 58, 60 of the spring elements 46, 48 of the second group rotate clockwise about the lug 42 in assuming the solid line position shown by the solid lines 58, 60 in Figure 1. With the second group of elements installed in place to define the cushion area 54, the assembler then installs the first group of elements 22, 24. From the dotted line position shown by the dotted lines 34*a* in Figure 1, the supporting portions 34 thereof are hooked under the adjacent lug 42 and rotated counterclockwise to the solid line position 34. From this position the lower end of each one of the first group of elements overlaps with and is readily secured to a corresponding one of the second group of elements by means of a clip 56 holding them in horizontal and transverse alignment. In that manner, the complete set of first elements is installed to define the cushion area 30 and thereafter the respective border wires 36, 66, and 68 are installed and clipped to the respective supporting areas by means of the clips 38 and 70.

In operation of the cushion assembly, the cushion area 30 yields most readily to loads in the vicinity of the shoulders of the occupant. The next stiffer area is the cushion area 54 due to the fact that the edge spacer bars 50 and the cross bars 52 have a tighter and closer order of arrangement than in the square loops of the first elements 22, 24 and this less readily yieldable area 54 is disposed so as to be slightly below the small of the back of a seat occupant. The actual small of the back of the occupant is received against the double layer portion immediately above the clip 56 wherein the elements of the first and second group overlap to provide a common cushion area which is the stiffest part of the cushion. As these cushion areas are loaded, the supporting portions 34, 60, and 64 of the wire elements readily rotate toward the plane flanges 44 about the respective lugs 42 thereon as a center and it may be noted that an individual lug 42 is provided for each supporting portion of each one of the wire elements in the rows. To this end, each of the upper, center, and lower retainers 16, 18, and 20 carries a series of these spaced lugs 42 each extending therefrom generally in the direction of the connected supporting portion of the attached wire elements.

The foregoing description will serve to illustrate to those in the art the manner in which the principles of the invention are embodied into actual spring cushion constructions and some of the advantages thereof. The sponge rubber padding and the usual upholstery cloth which are omitted from the drawings for the sake of clarity can be applied in evident manner by those skilled in the art and it is further evident that various modifications may be made in the specific structure illustrated and hence I do not intend to limit the scope of my invention thereto.

I claim:

1. A zig-zag spring cushion construction having a base

and top layer of spring means, said spring means comprising in combination a plurality of parallel sinuous spring strips spanning in successive arches across said base and having V-shaped supporting portions at the ends, said strips in combination providing a resilient top layer surface, and said V-shaped supporting portions each terminating at the end of the arch in a cross bar at the free end, and a rotatable joint formed at the free end of each supporting portion comprising an aligned lug on said base arranged with said cross bar supported with a rotating fit therein and limited to making straight line contact only with said base.

2. A zig-zag spring cushion construction having a base and top layer of spring means, said spring means comprising in combination a plurality of parallel sinuous spring strips having V-shaped supporting portions at each end, said strips in combination providing a first resilient surface located in said top layer and at least one other resilient surface of a different stiffness located therein, said V-shaped supporting portions each terminating in a cross bar at the free end, disposed adjacent said base and having a looped intermediate portion offset in a plane generally at right angles to the plane of the base, and spring securing means for pivotally securing the free end of each supporting portion to the base having a loop-receiving gapped portion in which said offset looped portion lockingly interfits and arranged with outer portions of said cross bar supported with a pivotal fit therein and limited to making straight line contact only with said base.

3. A zig-zag spring cushion construction having a base and top layer of spring means, said spring means comprising in combination a plurality of sets of parallel sinuous spring elements having V-shaped supporting portions at the ends, and arranged with the elements of one set longer than the elements of the other set, said spring elements being arranged with each long element of one set longitudinally and transversely aligned with a short element of another set and collectively providing a resilient area in said top layer which is supported by only one set of elements and a separate area in said top layer which is supported by only the other set of said elements, said V-shaped supporting portions each terminating in a cross bar at the free end and said supporting portions on the

short element facing in the same direction and said V-shaped supporting portion on said long elements facing in the opposite direction, and a rotatable joint formed at the free end of each supporting portion comprising spring securing means on said base arranged with said cross bar supported with a rotating fit therein and further arranged in engagement with a single open loop portion of said cross bar preventing movement thereof both ways in the axial direction.

4. A zig-zag spring cushion construction having a base and top layer of spring means, said spring means comprising in combination a plurality of sets of parallel sinuous spring elements having V-shaped supporting portions at the ends, and arranged with the elements of one set longer than the elements of the other set, said spring elements being arranged with each long element of one set longitudinally and transversely aligned with a short element of another set and collectively providing a resilient area in said top layer which is supported by only one set of elements and a separate area in said top layer which is supported by only the other set of said elements, said V-shaped supporting portions each terminating in a cross bar at the free end, disposed adjacent said base and having an intermediate locking portion offset in a plane generally at right angles to the plane of the base, and spring securing means for pivotally securing the free end of each supporting portion to the base having a loop-receiving gapped portion in which said offset looped portion lockingly interfits and arranged with an outer portion of said cross bar supported with a pivotal fit therein and limited to making straight line contact only with said base.

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