April 26, 1960 E. T. PAWLIKOWSKI 2,934,133

SPRING CUSHION CONSTRUCTION

Original Filed July 6, 1956 2 Sheets-Sheet 1

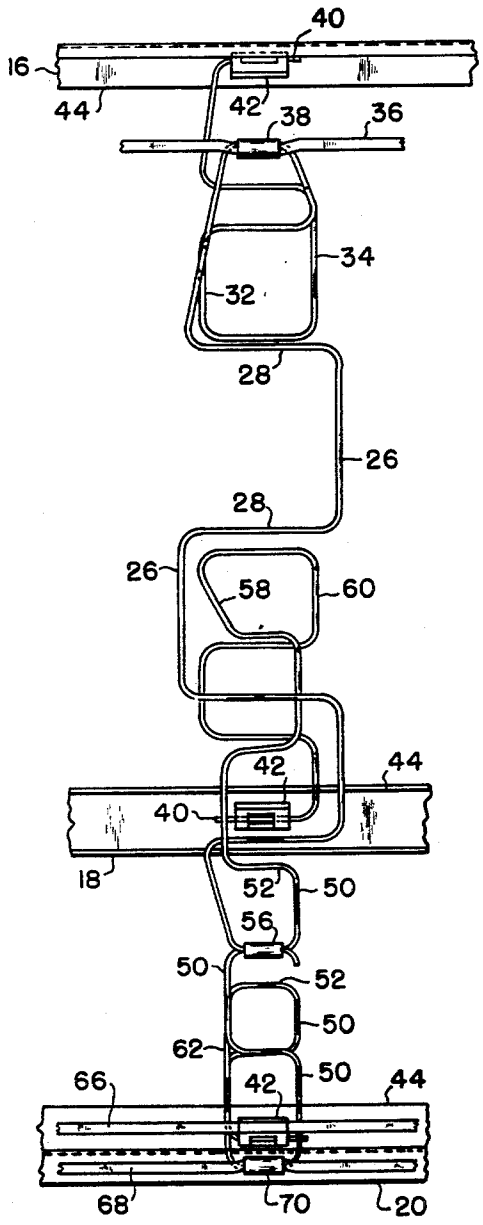


Fig. 2

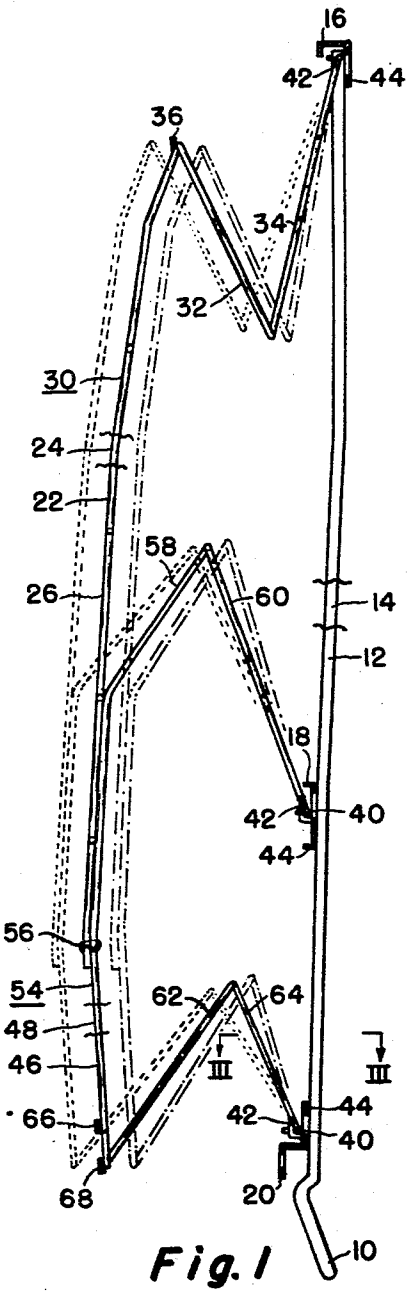


Fig. 1

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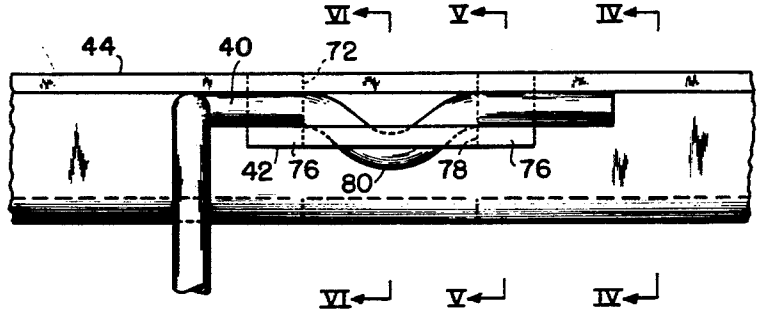


Fig. 3

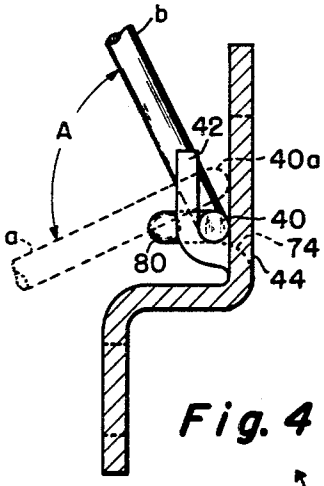


Fig. 4

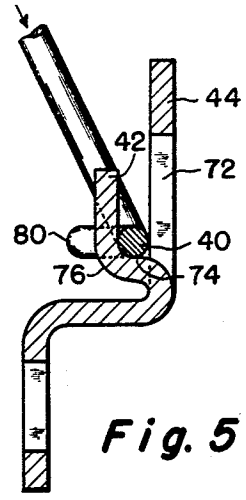


Fig. 5

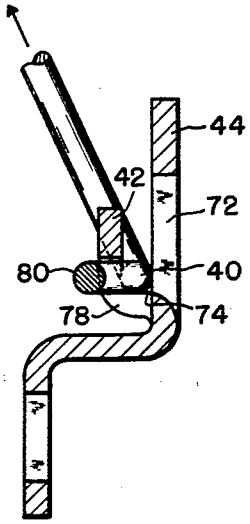


Fig. 6

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2,934,133

SPRING CUSHION CONSTRUCTION

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Original application July 6, 1956, Serial No. 596,312, now Patent No. 2,856,989, dated October 21, 1958. Divided and this application April 4, 1958, Serial No. 726,412

6 Claims. (Cl. 155—179)

The present invention relates in general to spring cushion constructions and more particularly to a quick attachment connection made between the supported end portions of wire spring strips provided in the cushion and a supporting frame or base which is also provided to which the strips are individually attached.

These spring wire connections have a strength in tension comparable to the positiveness of hooks without being actually a hook construction, and they enable the assembled ends of the spring wire to work with a freely pivoting action without dislodgment in accommodating to loads on the cushion. The present application is a division of co-pending Pawlikowski application, Serial No. 596,312, filed July 6, 1956, now Patent No. 2,856,989.

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 the supporting portion physically flexes adjacent the loop load deflections as compared to pivoting or otherwise having some freedom of movement of the attachment loop relative to the frame member to adjust to and more smoothly react to the load. Detachment of those previously known permanent connections for disassembly 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 except for the strips at the end of the row and the edges and ends of the webs thereof are interconnected by border wires which from 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 terminal portions of the assembled springs against lateral and longitudinal movement relative to the frame member when in place. In spite of the confining nature of this connection to prevent dislodgment, it nevertheless permits rotational freedom of movement in order that the supporting portion can pivot and enable the spring through torsional reaction to readily adjust itself to load.

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

Accordingly a primary object of this invention resides in the provision of a novel connection between the end of a spring strip and a spring support structure.

Another object resides in providing a novel combination of a spring strip and support structure wherein the end of the spring strip is formed to enable an interlock

with a bridge-like lug on a spring supporting member which is capable of quick assembly and disassembly. In conjunction with this object a further object resides in providing on the end of a rod-like spring strip a transverse integral cross-bar with an intermediate crimp enabling an assembled interlock with the side legs and cross member of a slotted lug projecting from the spring support frame.

A further object resides in the provision of a novel connection between the end of a spring strip and a spring support structure in which the spring strip end can be connected and disconnected from the support structure by predetermined flexing of the spring strip, the end connection enabling pivotally and/or torsional flexing of the assembled spring strip in assembly yet preventing lateral or axially displacement of the spring end away from its position on the support structure.

Further novel features and other objects of this invention will become apparent from the following detailed description, discussion and the appended claims taken in conjunction with the accompanying drawings showing a preferred structure and embodiment, in which:

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 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 rigid center retainer 18 of channel shape, 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 36 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 through an angle of 90° 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 at the terminal portion of the spring element has a pair of axially aligned substantially straight portions joined by a crimped intermediate section 80 defining a lateral bulge which, when the springs and frame are assembled, protrudes outwardly at substantially right angles to the plane flange 44 and projects through the window or opening defined by the retention slot 78 in lug 42 (see Figure 6). The aligned straight portions on each side of crimp 80 enable the cross bar 40 to rotate against the plane flange 44 within the crook 74 beneath the lug 42 but the cross bar 40 is prevented from dislodgment either axially along the crook 74 or transversely thereto by reason of interlocking engagement of the crimped intermediate section 80 with one end of the slot (Figure 6) 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. Cross bar 40 then bottoms against the lug bearing surfaces presented by the concave bend in the lug legs 78 after which the supporting portion (34, 60 or 54) is then rotated through the arc A approximately 90° to a point at which the cross bar crimp or loop 80 of supporting portion is disposed adjacent the end of lug slot 78, occupying the solid line position *b*. In reaching this point the crimped section 80, best seen in Figure 6, will have entered at one end and rotated approximately 90° closely adjacent the end of the retention slot 78 in the lug 42 and it will thereafter equally well resist torsional or axial or transverse tension and also pull-away movement of the cross bar portion 40 in the indicated direction of the arrow relative to the crook 74 in the bend of the lug 42. Figure 5 shows how these connections resist compressive stresses in the direction of the arrow due to thrust in the wire.

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 a slight amount in the opposite rotative direction toward the plane flange 44 and, when crimp 80 actually engages the end surface of lug 42, to adjust torsionally. As shown, the diagonal relationship 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, as the individual cross bars 40 on the portion 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 from the dotted line position *a* to the dotted line position *b* of Figure 4. At this point the supporting portions 60 at the upper end of the second elements are manually bowed into a shape at which the cross bar 40 carried thereby is adjacent the rigid center retainer 18. 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. From an appropriate upstanding position as visualized 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 change load as between the solid and dotted line positions illustrated by way of example in Figure 1, the supporting portions 34, 60 and 64 of the wire elements readily rotate toward and from 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 invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by United States Letters Patent is:

1. A metal frame formed of members for mounting elongated spring strips provided at their ends with substantially straight partially deformed attachment portions rectangularly related to the axes of the spring strips, said frame members including retainers each of which has a flange with spaced lug portions sheared therefrom, said lug portions being of substantial lateral width and bent longitudinally, and a longitudinally extending retention slot cut in each of said lug portions in the vicinity of their bend for cooperating with the flange on said retainers to retain the partially deformed ends of spring strips therein while permitting substantial pivotal movement within the crook of the bends, the angular length of said slot being of a measured extent of at least the better part of 90°.

2. The combination of a spring strip element, a mounting member transverse thereto, and a plane flange with retaining means secured to the mounting member to retain the element thereon for pivotal movement, said retaining means comprising a lug extending from said flange and formed with substantial lateral width and bent longitudinally, and a longitudinal retaining slot formed in said bent portion of the lug, said strip element having a supporting portion terminating in a cross bar having substantially straight end portions joined by a crimped intermediate section, said straight end portions being rotatably received in the crook of the bend in said lug and having the crimp on said intermediate section lodged within and engageable with an end section of said slot to torsionally adjust to load and prevent dislodgment of the spring supporting portion both axially and transversely with respect to the lug.

3. The combination of a spring strip element, a mounting member transverse thereto, and a plane flange with retaining means secured to the mounting member to retain the element thereon for pivotal movement, said retaining means comprising a lug part extending from said flange and formed with substantial lateral width and bent longitudinally, said strip element having a supporting portion terminating in a substantially straight cross bar part rotatably received in the crook of the bend of said lug, and a crimp and mating slot formed in the respective cross bar and lug parts to provide a single localized

connection between the two parts preventing dislodgment of the cross bar both axially and transversely from the crook of the bend as the cross bar rotates.

4. The combination of a zigzag spring strip, a flanged mounting member transverse to the spring strip, and retaining means thereon for engaging the end of the spring strip in a manner to permit pivotal movement relative to the mounting member, said retaining means comprising a lug offset from the plane of the flange of said mounting member and joined thereto in substantially parallel spaced relationship by means of bent leg portions separated by a slot, and a transverse bar member on said spring strip received between the lug and said flange and formed with a portion which after the spring strip has been moved a substantial angular distance in one direction engages an end of said slot between the lug leg portions to prevent dislodgment of the spring strip while permitting the described pivotal movement, the angular length of said slot being of a measured extent of at least the better part of 90°.

5. In a spring cushion construction having a row of longitudinally extending flanged members spaced by frame side members, spring securing means sheared from the flanges of all said longitudinally extending members, and formed wire strip elements secured in a plurality of arches across said row between successive connection points to said securing means to provide a supporting area, said strip elements having supporting portions bent to extend in a diagonal relationship with respect to said row of flanged members and having substantially straight transverse end portions received in said securing means to pivot in a crook therewithin, each said straight end portions having a lateral protrusion at an intermediate point adapted to be rocked so as to lodge itself in a window slot formed in the crook to resist dislodgment as the element supporting portion pivots therein.

6. Means forming a quick attachment joint between a spring strip element and a transverse mounting element comprising a diagonal load supporting leg on the spring strip element presenting a substantially straight transverse end attachment member, and a plane flange member secured to the mounting element with a uniform gap therebetween to secure the attachment member therein for rotational movement at the joint, at least one of said members having a preformed offset portion which upon relative rotation engages a portion of the other one of the members to prevent their disengagement both axially and transversely at that joint, said portion of said other member comprising the distal end of a slot having an angular length which is at least the better part of 90° in extent.

References Cited in the file of this patent

UNITED STATES PATENTS

2,578,331	White	Dec. 11, 1951
2,582,059	Neely	Jan. 8, 1952
2,845,996	Flint	Aug. 5, 1958