Aug. 25, 1964 S. L. DENNISON ETAL 3,146,030

AIR COOL CUSHION

Filed Aug. 17, 1962 3 Sheets-Sheet 1

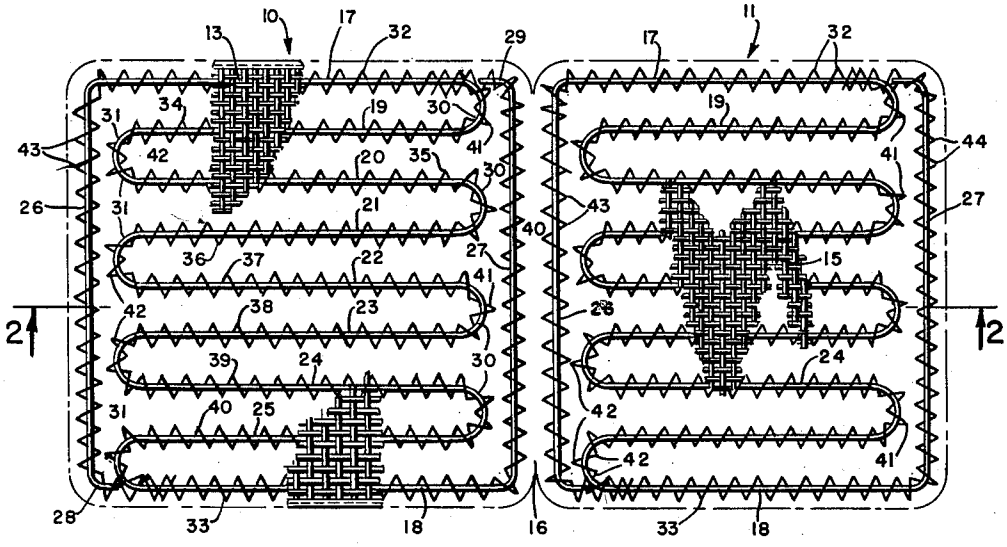

FIG. 1.

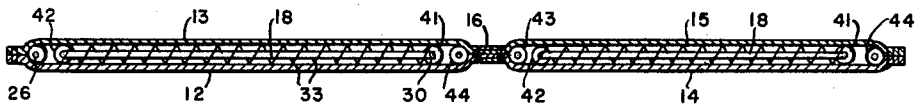

FIG. 2.

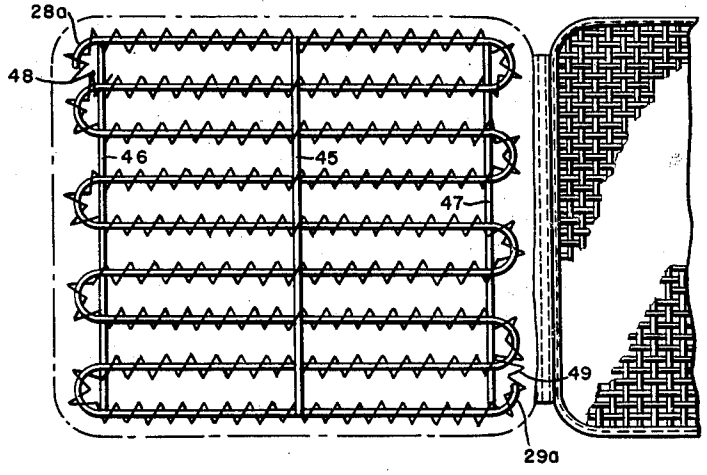

FIG. 3.

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AIR COOL CUSHION

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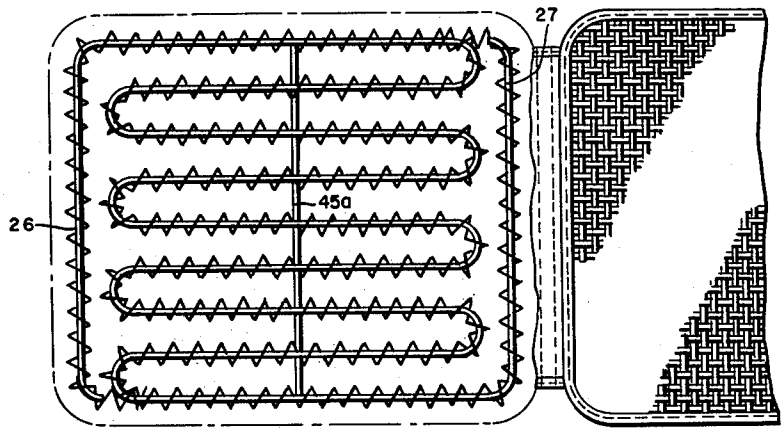

FIG. 4.

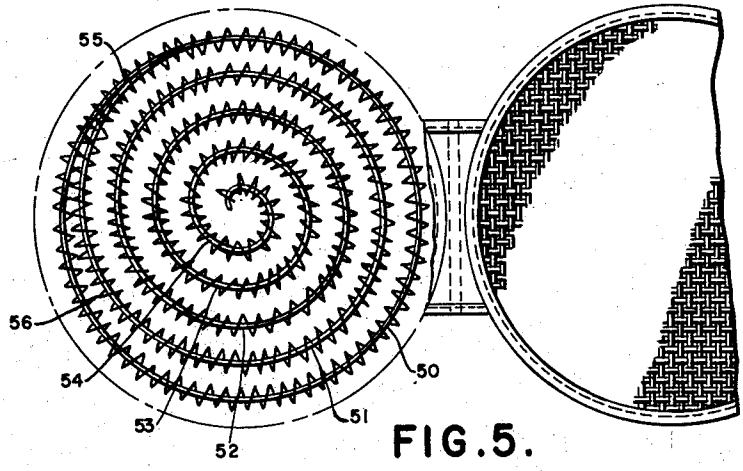

FIG. 5.

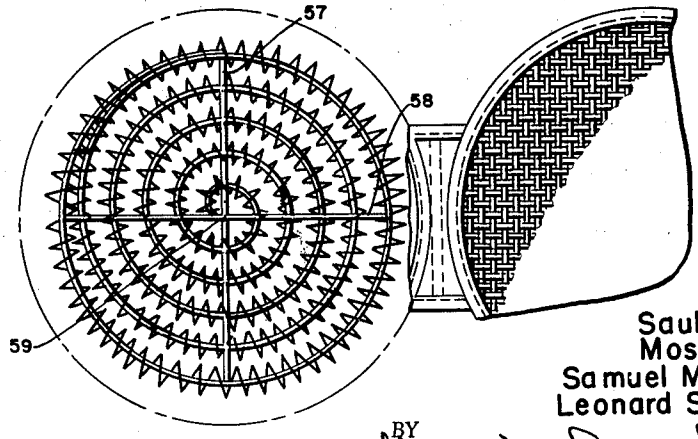

FIG. 6.

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AIR COOL CUSHION

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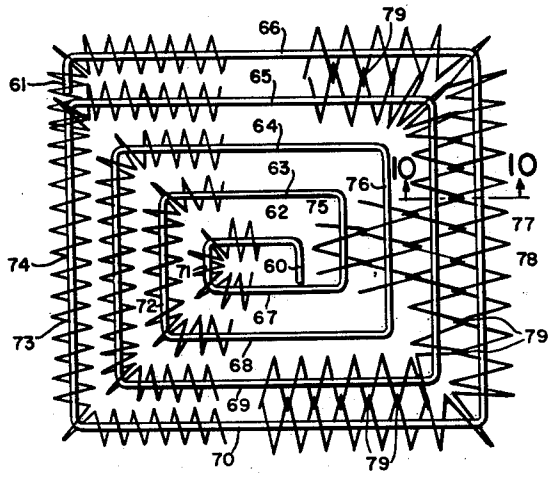

FIG. 7.

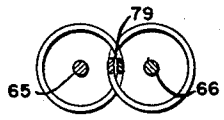

FIG. 10.

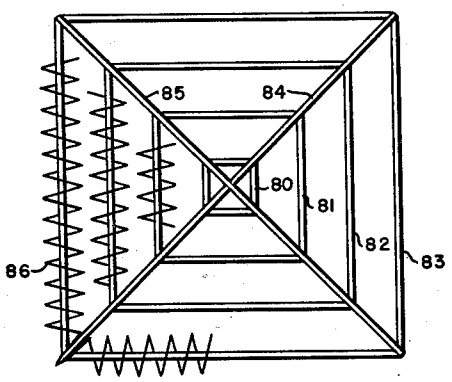

FIG. 8.

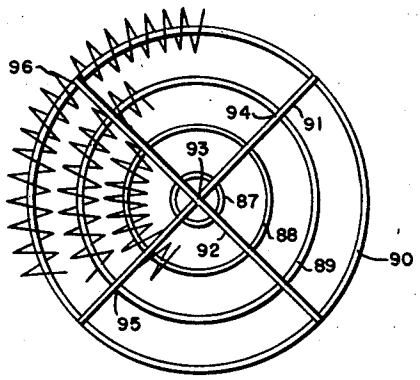

FIG. 9.

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3,146,030
AIR COOL CUSHION

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4 Claims. (Cl. 297—453)

The present invention relates to air cool cushion and more particularly refers to an inner filler for such cushion particularly adaptable for automotive use, although it will be understood that it may be used quite generally as an air cool inner cushion, pillow or the like.

Supporting cushions having air cooling features have been heretofore proposed for vehicular use involving coil springs, but although they involve and require interlocking of the wires and/or criss-crossing of the wires, with coils perpendicular to one another and crossing each other, the same have been unsatisfactory in that the use of an unrestrained coil permits the convolutions of the helix to tend to bulge out of alinement with the axis of the helix, and only the fabric casing of the cushion has any confining influence on this tendencny of the convolutions due to their resilient expansive action in getting out of line, unduly expanding where the greatest incumbent weight devolves and crowding together in areas of little superimposed weight, so that, generally, such coils are unsatisfactory, the answer having been sought in the interlocking and crisscrossing of the coils.

However, this has not met the problem in that the lengths of the unrestrained convolutions between interlocking and cross-over areas are still subject to the tendencies and disadvantages above mentioned.

Moreover, pure coils or even interlocking and crisscrossing coils do not, per se, give shape to a cushion, pillow or the like.

It is therefore an object of the invention to provide a member in association with the elastic helix which will at once govern the shape of the cushion and impose a restraint on the coils, preventing bulging out locally of coils and preventing generally the misalinement of the coils throughout the entire helix and its various sections; all to the end that cushions of preconceived shapes may be manufactured strictly according to plan, and in use, will maintain the originally imparted shape characteristics.

Another object of the invention is to provide in conjuncton with a resilient helix a shaping member or rod so as to follow any desired helical pattern and which will possess mechanical qualities that will retain the same in the shape to which bended, such member being passed through the convolutions of the helix to hold the same to line and to shape pattern.

A still further object of the invention is to provide a novel form of cushion in which more effective support of the incumbent person is realized, which will also counteract blockading of any of the air passages through the cushion and contribute to greater uniformity of cooling action throughout the length and breadth of the cushion.

Other objects of the invention are to stabilize the helical coils in the inner unit of an air cool cushion, anchor the coils to predetermined form pattern, to eliminate the necessity of interlocking of the coils and crisscrossing of the same although such interlocking and/or crisscrossing may be employed with the invention in cases where same may be desired, to prevent the coils running haphazard in undesired local directions; and the invention also contemplates the use of stabilizing braces for such shaping member which will also lend a contributing influence to the maintenance of the cushion shape and configuration.

With the foregoing and other objects in view, the invention will be more fully described hereinafter, and will be more particularly pointed out in the claims appended hereto.

In the drawings, wherein like symbols refer to like or corresponding parts throughout the several views:

FIGURE 1 is a plan view, with parts of the fabric casing broken away to reveal the inner filler, of a combined seat and back cushion constructed in accordance with the present invention.

FIGURE 2 is a longitudinal sectional view taken on the line 2—2 in FIGURE 1.

FIGURE 3 is a fragmentary plan view of a modified form of filler construction with the upper fabric member removed for clarity.

FIGURE 4 is a similar view showing a further modification.

FIGURE 5 is also a fragmentary plan view of the seat and back cushion with the inner filler revealed in the seat portion in which the various spaced sections of the helix are disclosed in circular or volute form rather than in the rectangular form shown in FIGURES 1–4.

FIGURE 6 is a view similar to FIGURE 5 showing a further modification.

FIGURE 7 is a plan view of a filler of a rectangular configuration in which some of the convolutions of adjacent coils interlock at strategic places and some do not interlock where interlocking may not be necessary or desirable.

FIGURE 8 is a plan view of a further modified form in which the shaping members are individual rectangles of progressively greater areas from the center outward, being held together by intersecting braces.

FIGURE 9 is a similar view in which the shaping members are circles of varying diameters.

FIGURE 10 is a fragmentary cross section through a portion of a filler in which the convolutions are flattened or elliptical to achieve interlocking.

Referring more particularly to the drawings and for the present to FIGURES 1 and 2, **10** designates an air cool seat cushion and **11** a back cushion or rest, both having inner fillers of similar constructions so that a description of one will suffice for both.

12 and **13** designate, respectively, a bottom fabric member and an upper fabric member which are foraminous or reticulated, or otherwise porous, for the free circulation of air therethrough, these members **12** and **13** being secured together along their edges to constitute a casing for containing the inner filler unit of the invention.

The back cushion **11** comprises similar rear and front porous fabric members **14** and **15**. A hinge joint **16** connects the seat and back cushion members **10** and **11** in a well known manner.

The inner filler unit is comprised generally of a shaping member and a spring helix.

In that form of the invention illustrated in FIGURES 1 and 2, the shaping member is a wire rod bent to provide side sections **17** and **18**, and intermediate sections **19**, **20**, **21**, **22**, **23**, **24** and **25**, these several sections being substantially parallel in the plane of the cushion and spaced apart. The shaping member or rod also includes a front edge section **26** and a rear edge section **27** bent, respectively, from the front end of the side section **17** and the rear end of the side section **18**. The terminal ends **28** and **29** of the shaping rod or member are incurved respectively to the side sections **18** and **17**. The members **26** and **27** are also substantially parallel to one another and are spaced forwardly and rearwardly respectively from connecting rear and front elbows **30** and **31** which alternate from rear to front in connecting the various parallel members **17–25**, so that a single strand of

wire rod or the like may follow through in a continuous manner the pattern as illustrated in FIGURE 1.

A resilient wire helix surrounds the shaping wire rod, preferably from end-to-end, and preferably in a continuous winding of a single fine wire, and includes sections similar to those of the shaping wire rod. In other words, coil side sections **32** and **33** surround the side sections **17** and **18** of the shaping wire rod, while intermediate helical sections **34, 35, 36, 37, 38, 39** and **40** surround the intermediate shaping wire rod sections **19–25**, inclusive. Rear and front helical connecting elbows **41** and **42** are wound about the connecting elbows **30** and **31** of the shaping wire rod. The helix also includes front and rear edge sections **43** and **44** wound about the front and rear edge sections **26** and **27** of the shaping wire rod.

The terminal ends of the helix are also preferably arranged at incurved terminal ends **28** and **29** of the shaping wire rod, the arrangement being that the terminal convolutions of the helix will abut the front and rear outermost elbows **31** and **30**.

Referring more particularly to FIGURE 3, a similar arrangement is illustrated with the following exceptions:

The terminal ends **28[a]** and **29[b]** are arranged at the right-hand front corner and left-hand rear corner of the seat cushion, and the members **26** and **27** are omitted.

In the second place, one or more braces, herein shown to be three in number, **45, 46** and **47**, are disposed laterally of the seat and crosswise of the intermediate and side sections **17–25**, inclusive, to which preferably each of said cross braces are welded or otherwise secured at the cross-over points. The front and rear braces **46, 47** make it possible to dispense with the members **26** and **27**. These cross braces **45, 46** and **47** entrain and localize the incident convolutions of the resilient helix to prevent spread of the helix to opposite sides of the braces **45, 46** and **47**. The terminal end portions **48** and **49** of the helix may be extended from the terminal ends **28[a]** and **29[a]** of the shaping member across the gap therefrom to the adjacent convolutions of the helix or to the braces **46** and **47**, with either of which such end the terminal end portions of the helix **48** and **49** may be intertwined.

Referring more particularly to FIGURE 4, the seat construction is as shown in FIGURE 1, in which a single central brace **45[a]** is crosswise of the various sections of the shaping member being welded to such sections preferably at all of the cross-over points. In this instance only the single brace **45[a]** is necessary in that the front and rear edge sections **26** and **27** of the shaping member are included.

Referring more particularly to FIGURE 5, the sections of the shaping member instead of being parallel are circular or volute. In other words, these sections **50, 51, 52, 53** and **54** are spaced apart radially and are wound into a substantially flat coil. The terminal end **55** of the outermost section **50** may be entrained with the helical section **56** of the helix at a point where the short lengths of the helical sections of members **50** and **51** meet and are enmeshed.

Referring more particularly to FIGURE 6, a similar volute coil arrangement is illustrated in which diametrical braces **57** and **58** cross and are welded or otherwise fixed to incident portions of the shaping member. These braces **57** and **58** may also be welded to one another at the central cross-over point **59**.

The modification in FIGURE 7 shows progressively expanding square-like figures having a central origin at an end **60** of the wire or other shaping rod and an outer terminus at the other end **61** of the rod after forming spaced side sections **62, 63, 64, 65, 66** and **67, 68, 69, 70** and **71, 72, 73, 74** and **75, 76, 77, 78**. In this FIGURE 7 some of the convolutions are overlapped or interlocked as indicated at **79**, while other side by side sections of the convolutions are free of one another and if desired spaced apart laterally as illustrated.

In FIGURE 8 the shaping member is constituted of individual rectangles **80, 81, 82** and **83** connected and held spaced apart by the cross braces **84, 85** arranged diagonally of the squares and affixed, as by welding or otherwise, to corner portions of the several rectangular frames. The helix is indicated at **86**, it being understood that the helix will be continued in separate sections about each frame **80, 81, 82** and **83**.

In FIGURE 9 the frames are individual circles **87, 88, 89, 90** of shaping wires of progressively greater diameter from the inside out, being connected together by the diametric braces **91, 92** welded to one another at the central cross-over point **93** and to the various circular frames at the two diametrically opposed cross-over points **94, 95**. The helix **96** is in a number of separate circular sections corresponding in number to the number of the frames **87, 88, 89** and **90**, it being understood that as many of the frames as desired may be used in this and other modifications.

FIGURE 10, which shows a section on the line **10—10** of FIGURE 7, illustrates one method by which adjacent convolutions of the helix may be overlapped or interlocked, that is by flattening the convolutions out of round whereby they may become elliptical, square or of other shape with portions overlapped at **79**.

The various braces may also be constituted of wire of appropriate gauge. The purpose of these various braces is to act as supporting members to prevent the heavy gauge wire shaping member from shifting its position and to give radial support to the over-all frame made up of the shaping member in all its sections and braces.

It will be noted that the helix is of thin wire coiled in the shape of a loosely wound spring. Through this coil we have the heavier wire which creates the shape of the pillow or cushion.

It is contemplated that additional welded supports, braces or brackets may be utilized to retain shape as required.

The helix is a resilient wire or filament of small gauge wound into open coils having a coarse lead in relatively small diameter helices. The wire of the helix is also relatively stiff to prevent collapse under incumbent weight but possessing sufficient elasticity to admit of being stressed under elastic deformation to store therein energy well beyond an elastic limit to enable the helix to recover its normal configurations as the deforming forces or strain are removed.

The shaping member will be of a gauge less than the diameter of the convolutions of the helix to permit deformation of the convolutions without interference from the shaping member. The coiled form of the helix is a configuration which in itself adds to the elasticity of the elastic fine wire from which the helix is formed. The arrangement is such that the weight of an occupant of the seat cushion will deform locally the convolutions of the helix, which will be free for such deformation and stressing but will be held to alinement both in the deforming and recovery movements by the shaping member.

The helix and shaping member will both possess physical properties and also mechanical properties of ductility, maleability, tensile strength and impact toughness which will conform to the pattern described to the end that an inner core or filler may be of long life and fulfill its function in supporting the incumbent weight without collapsing and with the characteristic of maintaining ventilating channels throughout the cushion below the person of the occupant.

The inner filler of this invention eliminates problems of fabrication and assembly, leaving the coils free to flatten and to expand and contract in response to stress conditions thereon. The external diameter of the shaping wire may be substantially less than the internal diameter or radius of the convolutions of the helix. The various adjacent sections of the helix may be spaced apart from one another a distance to avoid lateral overlapping or

interlocking, or as shown in FIGURE 7 a single filler may have some interlocking and some non-interlocking sections of the helix.

Although we have disclosed herein the best forms of the invention known to us at this time, we reserve the right to all such modifications and changes as may come within the scope of the following claims.

What is claimed is:

1. A seat cushion core comprising

(*a*) a substantially rigid forming member, and

(*b*) a coil of resilient wire wound about the forming member,

(*c*) said forming member being in substantially rigid sections,

(*d*) said sections spaced apart,

(*e*) substantially rigid means for connecting said sections in said spaced-apart relations,

(*f*) said coil of resilient wire divided into a plurality of helices,

(*g*) one helix surrounding each rigid forming member section,

(*h*) each said section having an external diameter less than the internal diameter of its helix

(*i*) so that the helix is permitted a lateral free movement relatively to its said section in addition to a flattening movement of the helix incident to superposition of load,

(*j*) the external diameter of the helices in relation to the spacing between adjacent sections being such as to restrain the lateral movement of the helices short of a point where the helices can overlap or cross.

2. A seat cushion core as claimed in claim 1 in which said helices are disposed in substantially concentric tiers about substantially concentric sections of the forming member with the helices having free lateral movement in a radial sense relatively to the sections and to one another.

3. A seat cushion core as claimed in claim 1 in which the forming member is in the general configuration of a polygon with sections thereof substantially parallel, and the helices in right lines.

4. A seat cushion core as claimed in claim 1 in which said means comprises elbows connecting the adjacent sections of the forming member.

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