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[45] May 22, 1973

[54] **SPRING DECK AND INSULATOR FOR FURNITURE**

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[52] **U.S. Cl.** **5/354**, 5/191, 297/452

[51] **Int. Cl.**.....**A47c 27/22**

[58] **Field of Search**.....5/190, 191, 220, 5/354; 297/454–457

[56] **References Cited**

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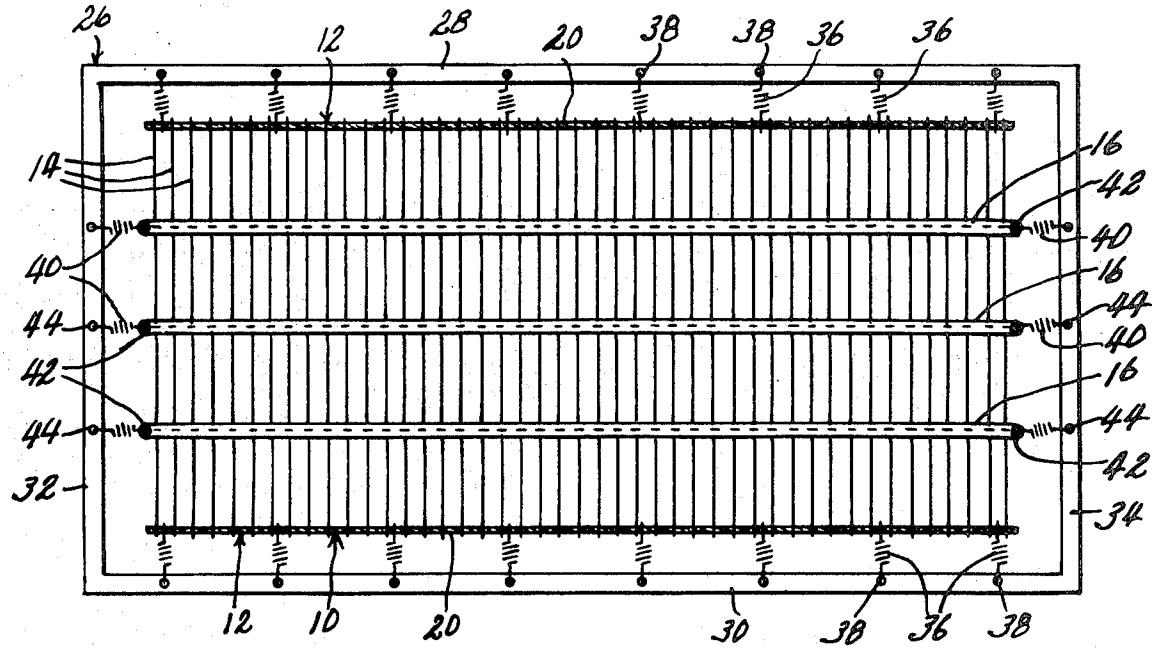
Primary Examiner—Casmir A. Nunberg

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[57] **ABSTRACT**

A spring deck and insulator for furniture consisting of a planar sheet having a continuous series of closely spaced parallel cross wires connected at their ends to flexible side strands and a series of flexible straps extending parallel to and spaced intermediate the side strands, each strap being secured to each of the cross wires at its point of intersection therewith, the sheet being adapted to be inserted with or without edge connections between a spring deck and padding layers of upholstered furniture for use as an insulator pad, or to be used as a spring deck by securing it in a rigid furniture frame by resilient fasteners extending from each of the side strands and from each end of each of the straps, to the frame.

10 Claims, 8 Drawing Figures



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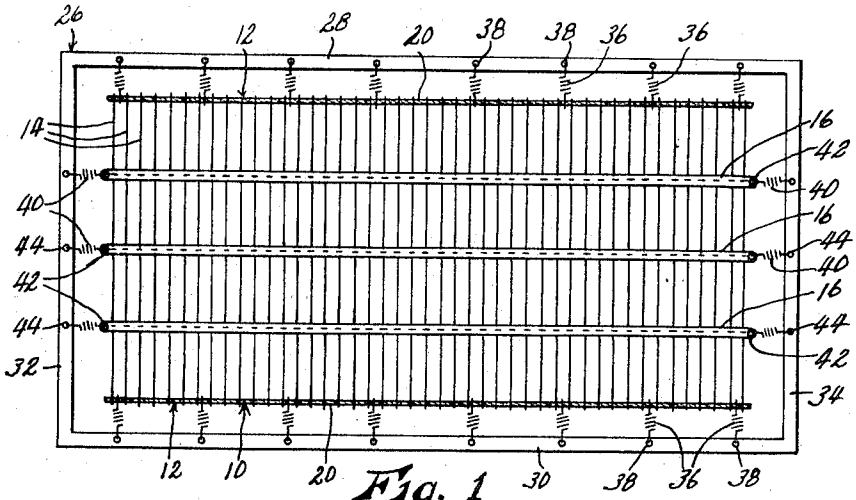


Fig. 1

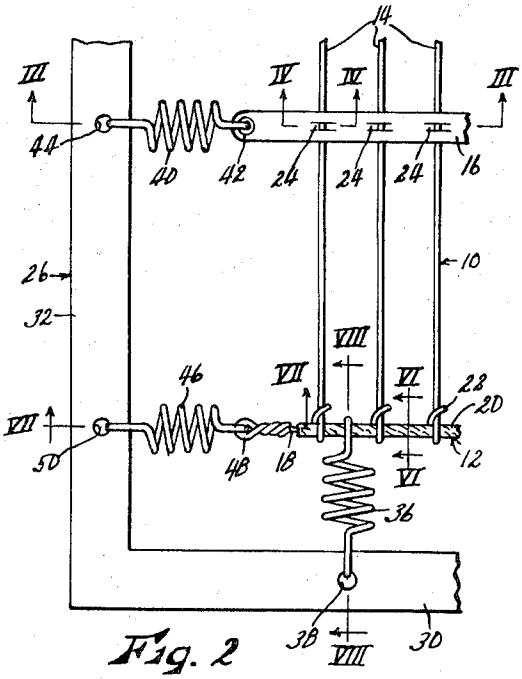


Fig. 2

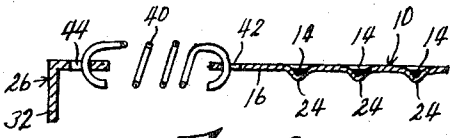


Fig. 3

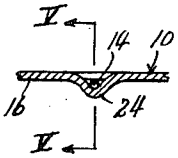


Fig. 4

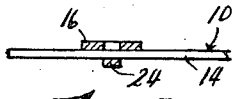


Fig. 5

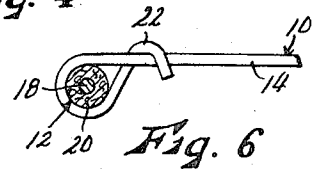


Fig. 6

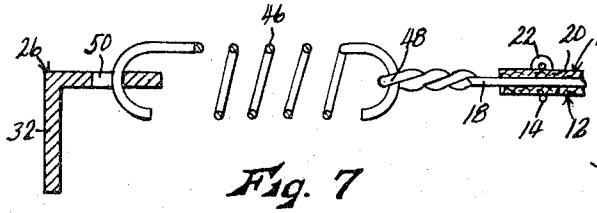


Fig. 7

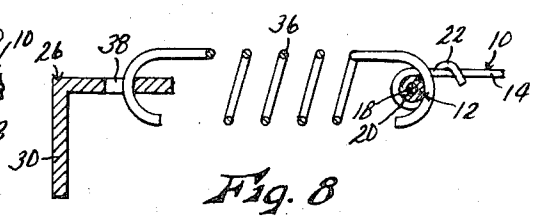


Fig. 8

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SPRING DECK AND INSULATOR FOR FURNITURE

This invention relates to new and useful improvements in furniture accessories, and has particular reference to a novel wire fabric sheet formed of resilient flexible strands which may be used, either as a spring deck for resiliently supporting mattresses, cushions, or other padding material in furniture, or as an insulator pad, insulator pads comprising sheets of flexible or pliable material intended for insertion between a base spring deck and the padding layers of upholstered furniture, with the purpose of better supporting the padding layers and preventing said padding from working downwardly into the spaces within and between the spring elements constituting the base spring deck.

A primary object of the present invention is the provision of a sheet for the above purposes which is resiliently flexible, having substantial resistance to flexure transversely of its plane. In either application thereof, this resilient stiffness tends to prevent over-localized yielding thereof when it is top-loaded in normal use, or in other words to reduce "hammocking" thereof under load by spreading the deflection over a larger area thereof. Such hammocking is a common and well-known cause of discomfort, particularly in edge-supported spring decks, such as are commonly used in baby cribs, cots, and other low-cost bedding structures. Even in the use of insulator pads, when the yield characteristics are ordinarily determined primarily by the base spring deck rather than by the insulator pad, the use of a resiliently stiff insulator pad can improve the yield characteristics by spreading the load, or permit the use of base spring decks in which the deck spring elements are more widely spaced, and which is hence more cheaply manufactured.

In the manufacture of a resiliently stiff sheet for these purposes it is economically desirable that it be a "woven" fabric of spring steel wires or other strands, and that it include strands extending angularly or at right angles to each other, in order to maintain a generally uniform flexibility about any axis. The difficulties of connecting intersecting strands of spring steel in such a manner that they are not bent or otherwise deformed to such an extent as to lose objectionably large degrees of their resilience, and in which they are not welded or otherwise heated so as to lose their temper, are well known. Accordingly, another object of the present invention is the provision of a novel attachment of intersecting spring steel strands which causes none of these undesirable results.

Other objects are simplicity and economy of construction, and efficiency and dependability of operation.

With these objects in view, as well as other objects which will appear in the course of the specification, reference will be had to the accompanying drawing, wherein:

FIG. 1 is a top plan view of a rigid frame, having a wire fabric sheet embodying the present invention mounted operatively therein for use as a spring deck,

FIG. 2 is an enlarged fragmentary view similar to FIG. 1, showing a corner portion of the frame, and showing also a slight modification of structure,

FIG. 3 is a fragmentary sectional view taken on line III—III of FIG. 2,

FIG. 4 is an enlarged fragmentary sectional view taken on line IV—IV of FIG. 2,

FIG. 5 is a fragmentary sectional view taken on line V—V of FIG. 4,

FIG. 6 is an enlarged fragmentary sectional view taken on line VI—VI of FIG. 2,

FIG. 7 is an enlarged fragmentary sectional view taken on line VII—VII of FIG. 2, and

FIG. 8 is an enlarged fragmentary sectional view taken on line VIII—VIII of FIG. 2.

Like reference numerals apply to similar parts throughout the several views, and it will be seen in FIG. 1 that the resilient sheet forming the central subject matter of the present invention, and which may be utilized either as a spring deck or as an insulator pad, is indicated generally by the numeral **10**, and includes a pair of generally parallel side strands **12**, a series of cross wires **14** extending between said side strands at right angles thereto and secured at their ends to said side strands, and a series of steel straps **16** extending parallel to said side strands in spaced relation thereto and attached to said cross wires. Side strands **12** each have a core **18** consisting of a relatively heavy spring steel wire, said core being wrapped or covered by a sheath **20** of soft, indentable material such as twisted paper or the like. Said side strands are spaced apart the full width of the sheet.

Cross wires **14**, which are of tempered spring steel, are disposed in a continuous series extending in parallel, spaced apart relation between side strands **12**, at right angles to said side strands, and each cross wire has its ends affixed respectively to the two side strands by being wrapped tightly about the sheaths **20** thereof, in indenting relation thereto, and then twisted about itself in a "knot" **22**, as best shown in FIG. **6**. The sheaths **20** form a strong, anti-slip purchase for the cross wires, and also prevent the rubbing or grating "wire noises" which would otherwise occur during use. Straps **16** constitute thin planar strips of spring steel and extend the full length of sheet **2** in parallel, spaced apart relation intemediate and parallel to side strands **12**, overlying cross wires **14**. Each strap is secured to each cross wire at its point of intersection therewith, in a manner best illustrated in FIGS. **4** and **5**. A pair of parallel slits are cut longitudinally in the strap over each wire, whereby to form a narrow band **24** of the strap therebetween. Said band is centered with respect to the associated cross wire, and is several times as long as the diameter of the wire. Band **24** is then offset downwardly as shown by pressure thereon, and wire **14** inserted transversely through the loop formed between said band and the remaining, undeflected portion of the strap at that lateral line thereof. Preferably, band **24** is depressed only sufficiently to permit the insertion of the wire, so that when released, it will recover elastically to a sufficient degree to clamp the wire firmly in place. This type of connection has several advantages. It can be performed rapidly and efficiently on automatic machinery, as by feeding straps **16** longitudinally past a work station at which the bands **24** for each wire are cut and depressed by rolling toothed wheels, and at which wires **14** are successively inserted, the cutting teeth being notched to permit the insertion of the wires. Also, side strands **12** may be fed concurrently with the straps, and cross wires **14** knotted thereabout at the same work station. The connection involves no application of heat, and there hence can be no loss of temper from this cause. Also, there is almost no loss of temper or resilience due to cold working or permanent deformation.

Cross wires **14** are of course not affected at all in this manner, and straps **16,** though slightly deformed, are not materially affected so long as bands **24** are sufficiently narrow relative to the total width of the strap. The bands should be no wider than perhaps one quarter of the strap width, as shown, and may actually be substantially narrower. While the connection is quite adequately secure for the purposes intended, it will be seen also that if bands **24** are sufficiently narrow, the connection will permit a degree of relative pivoting of the wires and the straps, in the plane of the sheet. Strains tending to produce this type of movement occur continuously in normal usage, and the pivotability provided tends to remove localized stresses from the wires and straps at the connections.

If the sheet **2** is to be used as a spring deck in its own right, it must be resiliently supported in a furniture frame. Such a frame, which as shown may constitute the frame of a baby crib, cot, or other bed, is indicated generally at **26,** and consists of side rails **28** and **30** and end rails **32** and **34.** Said side and end rails are formed of angle iron and are rigidly interconnected to form an open rectangular frame somewhat larger in both dimensions than sheet **2.** Sheet **2** is disposed centrally in said frame, and side strands **12** thereof are each connected to the adjacent side frame rail by a series of helical springs **36** extending at right angles to said side strands. Each spring is hooked at one end around said side strand, and at its opposite end into a hole **38** punched therefor in the side frame rail. Said springs are installed under a degree of resilient extension. The stiff core wires **18** of the side strands permit a smaller number of springs **36** to be used, spaced at greater intervals along the side strands, since stresses applied to a number of cross wires **14** in use are transmitted thereby to a single spring. Each end of each strap **16** is also connected to frame **26** by a tensioned helical spring **40,** each of said springs being hooked at one end in a hole **42** formed therefor in the end portion of its related strap **16,** and at its opposite end in a hole **44** formed therefor in the adjacent end frame rail **32** or **34.** Also, each end of each side strand **12** may be attached to the end frame rails by a helical spring **46** as shown in FIGS. **2** and **7,** one end of said spring being hooked in an eye **48** formed by extending and twisting the core wire **18** of the side strand, and the opposite end of said spring being hooked in a hole **50** formed therefor in the adjacent frame end rail. While the use of both a side spring **36** and an end spring **46** at each corner of sheet **2** does improve the corner support of the sheet, the extension and twisting of core wires **18** to form eyes **48** does represent a time-consuming and hence expensive operation, and in some cases springs **46** may be dispensed with, as indicated in FIG. **1.** Also, if desired, end springs **46** could be used and the endmost side springs **36** at each side of the frame dispensed with. In some cases it may be desirable to attach one edge of the sheet, notably the forward edge in seating structures, directly to the frame, as by stapling, rather than by springs. The present structure is admirably suited for this type of connection.

Of course, if sheet **2** is to be used simply as a padding insulator pad, the edge springs **36, 40,** and **46** are not used, and the sheet **2** is simply laid over a base spring deck, either attaching said sheet to the deck, as by clipping it to the deck, or not, and the padding material applied thereover.

In use either as a spring deck or as an insulator pad, the close spacing (about one inch) of cross wires **14** provides sufficiently continuous support for any mattress, cushion, or other padding material applied thereover to prevent said padding material from working downwardly therebetween. Straps **16,** by their width, also assist in providing this support. Also, the resilient resistance to flexure of sheet **2,** transversely to its plane, creates a degree of stiffness which tends to spread the downward deflection thereof caused by localized loading over a larger area thereof. This reduces the previously discussed "hammocking" effect, and the discomfort normally resulting therefrom, by causing a higher proportion of the total yield of sheet **2** to be the result of yielding of edge springs **36, 40,** and **46,** rather than virtually entirely from the bowing or hammocking of the sheet itself. The reduction of hammocking by the resilient stiffness of the sheet is of course particularly important in the spring deck usage of the sheet. However, this stiffness is also important in the use of the sheet as an insulator pad, since it permits the sheet to be applied, without loss of comfort or support, over a spring deck the coil springs or other spring elements of which are more widely spaced apart, thus rendering the total structure more economical. In the insulator pad usage, however, the core wires **18** of side strands **12** serve no particular function, and could be dispensed with.

The connections as shown between cross wires **14** and straps **16** are quite important. They may be performed rapidly and economically by automatic machinery. They involve no significant deformation or application of heat to the spring members, so that they cause substantially no loss of resilience or spring temper. The straps maintain uniform spacing of the cross wires, which is of course essential to the padding support function of the sheet. The relative pivotal movement of the wires and straps, in the plane of the sheet, as permitted by the connections shown, is also important. Such movement tends to occur every time the sheet is deflected to a non-planar form by loading thereof, and if not permitted, would cause localized stresses at the connections, particularly in wires **14,** which could cause early failure and breakage thereof.

While we have shown and described certain specific embodiments of our invention, it will be readily apparent that many minor changes of structure and operation could be made without departing from the spirit of the invention.

What we claim as new and desire to protect by Letters Patent is:

1. A device adapted to be used either as a spring deck or as an insulator pad, comprising a generally planar sheet inelastic in its own plane but possessing substantial resilient resistance to flexure transversely of its plane about any line thereof in any direction.

2. A device as recited in claim **1** intended specifically for use as a spring deck, in which is additionally included a series of elongated, longitudinally extensible connectors connected to said sheet at spaced intervals around any desired portions of the periphery thereof and extending outwardly therefrom, said connectors being adapted to be resiliently extended and connected at their outer ends to a rigid furniture frame.

3. A device as recited in claim **1** wherein said sheet comprises:

a. a pair of side strands disposed in generally parallel relation,

b. a continuous series of resilient cross wires extending in parallel relation between and secured at their ends to said side strands, and

c. resilient straps extending parallel to and intermediate said side strands, and intersecting said cross wires, each of said straps being attached to each of said cross wires at its point of intersection therewith.

4. A device as recited in claim **3** intended specifically for use as a spring deck, with the addition of a series of elongated, longitudinally extensible connectors connectable to said side strands in spaced relation therealong, and to each end of each of said straps, and extending outwardly from said sheet, said connectors being adapted to be resiliently extended and connected at their outer ends to a rigid furniture frame.

5. A device as recited in claim **4,** wherein said side strands are also resilient, whereby longitudinal stresses on a plurality of said cross wires are transmitted by said side strands to each of said connectors.

6. A device as recited in claim **5** wherein each of said side strands includes a resilient wire having an eye formed at each end thereof, and with the addition of connectors connectable to each end of each of said side strands and adapted to be resiliently extended for connection at their outer ends to said rigid furniture frame.

7. A device as recited in claim **3** wherein each of said side strands constitutes a spring wire core having a sheath of soft, indentable material applied thereto, each of said cross wires being twisted tightly about the sheath of each of said side strands and then about itself.

8. A device as recited in claim **3** wherein each of said cross wires is attached to each of said straps by means permitting a degree of relative pivotal movement therebetween, in the plane of said sheet.

9. A device as recited in claim **3** wherein a narrow longitudinal band of each said straps, intermediate the transverse edges thereof and transversely spanning each cross wire intersecting said strap, is offset transversely from the plane of said strap to form a loop in conjunction with the non-offset portion of said strap, said cross wire extending through said loop.

10. A device as recited in claim **9** wherein said loop is elastically contracted by the resilience of said strap, whereby said wire is gripped in said loop.

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