

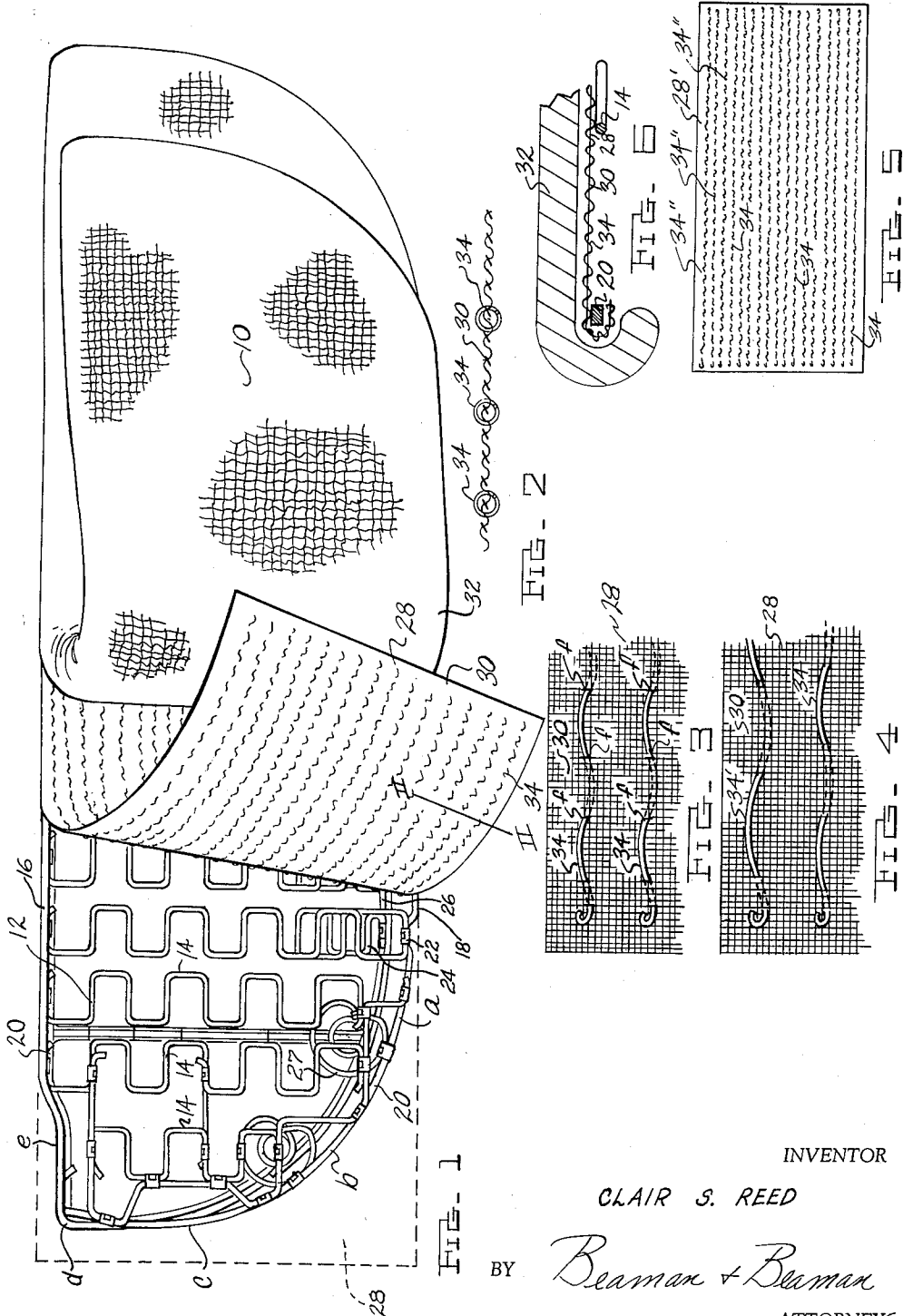
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INSULATOR STRIP

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1

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INSULATOR STRIP

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The present invention relates to improvements in insulators as used with pads to improve the support for cotton, foam and other forms of soft, flexible padding employed in the upholstery of spring structures. While the invention is particularly useful in spring structures used in seat cushions and seat backs of vehicles, being a continuation-in-part of my application Serial No. 613,224, filed October 1, 1956, now Patent 2,906,320 dated September 29, 1959, it is useful in furniture and other fields.

Insulators of the type above described take many forms, the most common being a flexible strip of burlap which is disposed between the supporting surface of the spring structure and the soft, flexible upholstery padding. It is the purpose of such insulators to prevent the padding from sagging or cupping around and between the spring elements which define the supporting surface of the spring structure. To assist the burlap, or other form of fabric or flexible sheet, in providing a bridging support for the padding across the irregular spaces of the openwork surface defined by the individual spring elements, reinforcing strands and wires in the form of straight lengths of materials have been heretofore used.

The "riding" quality or comfort of a seat cushion or seat back, for example, as well as the so-called "show-room feel" is provided by the individual action of the separate spring elements which collectively make up the supporting surface of the spring structure. This individual action permits a person to sit "in" rather than "on" a seat cushion or seat back.

It is an object of the present invention to provide an improved insulator in the form of a flexible sheet having reinforcing elements spaced and carried by the sheet, the construction of the insulator being such that it does not materially affect the individual action of the separate spring elements.

Another object is to provide an improved insulator in which the reinforcing elements may, if desired, extend beyond the border frame, or portions thereof, of the spring structure because of the ease with which the insulator and its reinforcing elements may be wrapped or draped around or over the border frame along with the cotton padding, or other similar material during the trimming operation of the seat cushion or seat back.

A further object of the invention is to provide an insulator for spring structures in the form of a flexible sheet which spaces parallel arranged reinforcing wires of spiral form, the wire gauge, the diameter of the coil, and the pitch of the spiral form of the wires all being variable to regulate the influence of the insulator upon the individual action of the separate spring elements of the supporting spring structure.

A still further object is to provide an insulator in which the form of the reinforcing wires permit the use of fewer and lighter gauge wires and also permits the use of a single piece of flexible sheet to extend the full width of the seat cushion or seat back of a design for the support of more than one person.

A still further object is to provide an improved insulator characterized by its ability to be conveniently wrapped upon the border wire of the spring structure without the reinforcing presenting any interference problem to wrapping and having the further quality of "keying" the cotton, foam, or other padding, to the separate spring elements of the spring structure, all without material detriment to the "feel" and "riding" qualities.

2

A still further object is to provide an improved upholstered spring structure having individual spring elements supported within a border frame, an insulator having spaced spiral form wires extending over the spring elements and beyond at least some portions of the border frame and being wrapped or draped over such portions along with the upholstery padding.

These and other objects and advantages residing in the combination and arrangement of the component parts of the insulator and the padding with the spring structure, will more fully appear from a consideration of the following detailed description and the appended claims.

In the drawings,

FIG. 1 is a plan view of a spring structure with the upholstery components shown pulled back to expose the spring structure,

FIG. 2 is a fragmentary cross-sectional view taken on line II—II of FIG. 1 of the insulator,

FIG. 3 is a fragmentary portion of the insulator showing the construction of similar reinforcing wires,

FIG. 4 is a view similar to FIG. 3 showing dissimilar reinforcing wires,

FIG. 5 is a diagrammatic plan view of an insulator indicating the use of reinforcing wires of different gauge, and

FIG. 6 is a diagrammatic view illustrating the trimming of the padding and insulator about the border frame.

Referring to the drawings, in FIG. 1 is shown a rear seat cushion 10 in current use in passenger vehicles, comprising a spring structure 12 of well known form. The supporting surface of the structure 12 is to a great extent collectively defined by a plurality of sinuous spring elements 14 and known in the trade as "formed wire" spring elements. The spring elements 14 extend between the sides 16 and 18 of the border frame 20, the elements 14 being attached to the frame 20 by suitable clips 22. "Fish mouth" extensions 24 of some of the spring elements 14 extend between the frame 20 and the lower frame 26. Coil springs 27 are also shown extending between the frames 20 and 26. The spring elements 14 and the directly associated structure define what is hereinafter referred to as an openwork supporting surface upon which the usual upholstery padding is supported.

My improved insulator 28, for the purpose of effecting economy in fabrication and to reduce inventory, in addition to completely covering the supporting surface of the spring structure 12, preferably comprises a single rectangular piece of flexible sheet material 30. The sheet material 30 may be woven burlap, knitted open mesh paper fabric, or other form of flexible sheet material. In practice, woven burlap is more generally used and in the preferred form of the present invention is used for the flexible sheet material.

As disclosed, a piece of woven burlap fabric of a length to substantially cover the full width and length of the seat cushion 10 is provided with portions, if desired, extending beyond the border frame 20, or at least some portions thereof. The extensions of the portions of the burlap reinforced by the wires 34 beyond the border frame 20 will usually be confined to that part of the seat cushion or seat back where the deviation from a rectangular form takes place. However, it may be as shown in FIG. 1 in full line wherein the insulator 28 has been turned back to expose the spring structure 12. In dotted line representation in FIG. 1, the insulator 28 is shown disposed upon the spring structure 12 and extending beyond the border frame 20 at the end of the structure 12 defined by the section of the border frame 20 between the points designated by letters a, b, c, d and e.

To support and reinforce the burlap 30 to enable the burlap in turn to support a conventional form of cotton

3

or foam padding 32 (shown folded back upon itself in FIG. 1 to expose the insulator 28 and the spring structure 12), reinforcing members are provided. In contrast to the present practice of using straight lengths of wire for reinforcing the burlap or insulator, the reinforcing elements of the present invention preferably take the form of spring steel wires 34 of undulating form so as to impart to the wires 34 a degree of longitudinal extensibility that will avoid objectionable interference with the individual action of the spring elements 14 while, at the same time, giving the burlap 30 the reinforcement required to adequately support the padding 32.

In practice, the insulator 28 may be attached to the under side of the padding 32 by sewing or by an adhesive, or the insulator 28 may be separately attached to the spring structure 12 or merely loosely inserted between the spring structure 12 and the padding 32.

With a seat cushion or seat back of a form other than rectangular, it will be appreciated that if the insulator 28 is of rectangular form that the width of the insulator 28 need only conform to the width of the spring structure 12 in order to provide complete support for the padding 32, assuming that the wires 34 are substantially coextensive in length with the length of the burlap 30. With such a construction, the wires 34 will only extend over the border frame 20 along the arc of the frame 20 designated by reference letters *a*, *b*, and *c*. With such an arrangement, as will be more fully described hereinafter, only the wires 34 of the insulator 28 which project beyond the border frame 20 at the arc *a*, *b* and *c* will be wrapped or draped about the border frame 20 along with the padding 32.

As now contemplated for use in vehicle seat cushions for passenger vehicles, the wires 34 will be of oil tempered steel of 16 to 21 gauge and will be spaced in parallel arrangement on $\frac{1}{2}$ " to $2\frac{1}{2}$ " centers. The wires 34 will preferably be of spiral form with the diameter of the coils of the spiral form being substantially equal along the entire length of the wires 34 and the diameter of the coils being in the range of $\frac{5}{32}$ " to $\frac{5}{16}$ " with the pitch of the spiral form being in the order of a range of 1" to 2".

By reducing or increasing the gauge of the wires 34, by increasing or reducing the diameter of the coils of the wire 34, and/or by increasing or reducing the pitch of the spiral form of the wires 34, the degree of resistance of the wires 34 to transverse deflection or longitudinal extension by a load directed upon the padding 32 and carried by the spring structure 12 may be varied at will to alter the "riding" and "feel" characteristics of the fully trimmed seat cushion or seat back.

As shown in FIG. 3, the wires 34 penetrate the burlap 30 at points *f*, the distance between points *f* being equal to one-half the pitch of the spiral form. It will be understood that with such an arrangement that equal portions of the wires 34 will be exposed upon opposite sides of the burlap 30.

In FIG. 4, the coils of spiral form of the wire 34' is illustrated as having a greater diameter than the adjacent wire 34, as well as having a greater pitch.

In FIG. 5, the insulator 28' is shown as having several wires 34" of lighter gauge than the remaining wires 34. Normally, the lighter gauge wires will be employed in seat cushions and seat backs in areas subjected to minimum supporting loads.

FIG. 6 is a diagrammatic showing to illustrate the manner in which the insulator 28 may be wrapped or draped about the border frame 20 along with the padding 32. Where the insulator 28 has substantially the same length as the length of the spring structure 12 and the wires 34 are substantially coextensive in length to the length of the burlap 30, in such event only that portion of the insulator 28 and the wires 34 connected therewith which extend beyond the border frame 20 along the arc *a*, *b*

4

and *c* would be wrapped with the padding 32 about the border frame 20 in the manner illustrated in FIG. 6.

It will be readily appreciated that the wires 34 will tend to hold the insulator 28 from shifting relative to the spring structure 12 as well as holding the padding 32 from shifting relative to the insulator 28. From this point of view, the insulator 28 may be considered as acting to "key" the padding 32 to the supporting structure of the spring structure 12.

In practice, and as a result of extensive, accelerated tests designed to simulate conditions of use of seat cushions and seat backs in service in passenger vehicles, it has been found that the number of spiral form wires 34 required to be used in the insulator 28 may be reduced as compared to the number required where the reinforcing wires are of straight wire lengths and without sacrificing the degree of required support for the burlap 30. Also, it has been found, as a result of the aforesaid tests, that a lighter gauge wire may be used when of spiral form than may be used when in the form of straight lengths of wire, without experiencing structural failures of the wire. It is believed that the spiral form of the wires 34 apparently distributes stresses which are otherwise concentrated in the use of straight wires. Another advantage of the spiral form of the wires 34 resides in the increased area of contact between the burlap 30 and the wires 34. This increased area of contact will readily appear from FIG. 3.

The wires 34 will usually be of oil tempered spring steel. However, other forms of wire may be used depending upon the type of reinforcement of the burlap that is desired, such as, for example, hard drawn wire, mild steel wire, etc.

As disclosed in my co-pending application, above mentioned, the reinforcing spiral wires for the burlap may conform to the general shape of the supporting surface of the spring structure. While this arrangement avoids any necessity of bending the reinforcing wires 34 about the border frame 20 of the spring structure during the trimming operation, it presents inventory problems as will be readily appreciated. Every deviation of a spring structure supporting surface from a square or rectangular form will necessitate the stocking of an insulator of a specific form at least as to the area reinforced by the spiral wires 34.

I claim:

1. In combination with an upholstery spring structure having an elongated openwork supporting surface including a horizontally extending elongated border frame and springs within and connected to said border frame; a substantially flat horizontally extending elongated insulator disposed lengthwise in substantially surface to surface relation upon said supporting surface throughout the length thereof, said insulator being substantially coextensive in width to the width of said border frame and having end portions extending endwise beyond end portions of said border frame, said insulator comprising a single sheet of flexible material, and reinforcing strands threaded through said sheet material, longitudinally spaced portions respectively of said strands being disposed alternately above and below said sheet material, portions of said strands being adjacent opposite ends of said sheet material, the sheet material of the endwise extending portions aforesaid of said insulator and the portions of said strands adjacent opposite ends of said sheet material being in intimate contact and wrapped together downwardly around end portions of said border frame and holding the wrapped sheet material aforesaid against displacement.

2. The structure defined in claim 1, wherein the sheet material is formed of burlap and the strands are formed of wire, all of said wires having extensible portions of undulating form within the confines of said border frame and capable of yielding to localized pressure without affecting the wrapped portions of said wires.

5

3. The structure defined in claim 1, wherein the elongated border frame has curved end portions, the insulator is rectangular in configuration, portions of the sheet material are wrapped downwardly around said curved end portions of the border frame, and portions of the reinforcing strands are wrapped downwardly around said curved end portions of the border frame and hold said wrapped portions of the sheet material against displacement.

5

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