April 30, 1963 R. B. MELEN 3,087,169

SPRING ASSEMBLY

Filed July 3, 1961

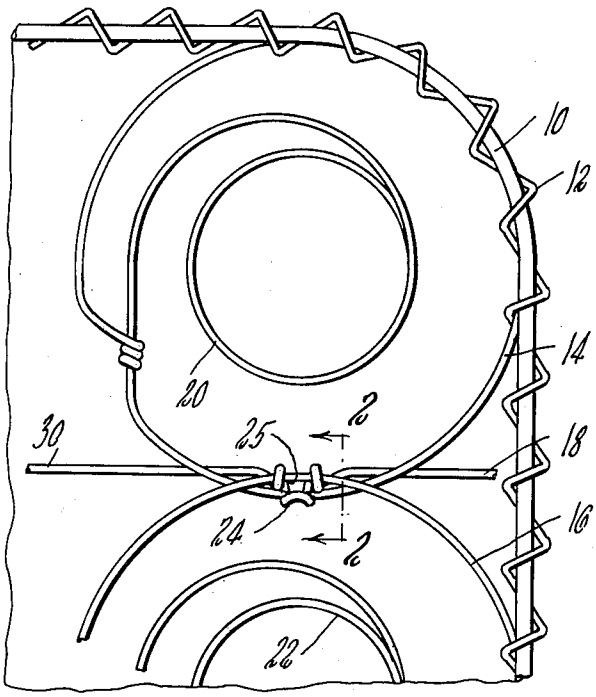


Fig. 1.

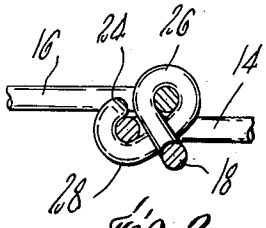


Fig. 2.

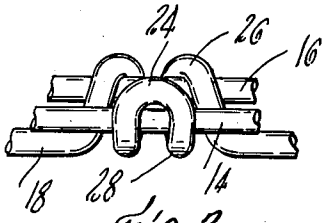


Fig. 3.

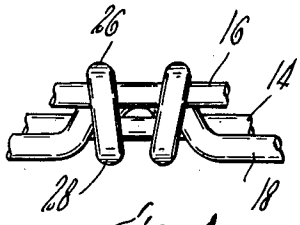


Fig. 4.

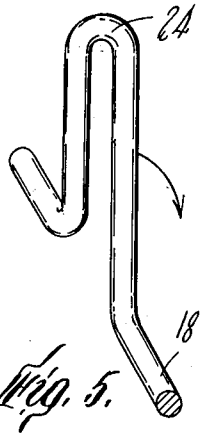


Fig. 5.

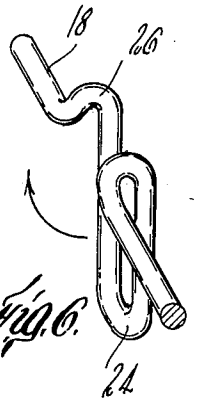


Fig. 6.

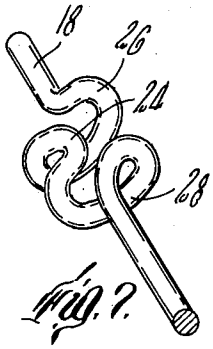


Fig. 7.

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SPRING ASSEMBLY

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This invention relates to spring assemblies of the type used in mattresses, as box springs, for seat cushions, chair backs and the like. More particularly the present invention relates to spring construction using spaced rows of coil springs and specifically to tie wires and formations used to fasten adjacent coil springs of a row to one another and to hold the springs of that row in proper spaced relation to the springs of the next row.

One object of the present invention is to provide an improved tie wire construction which is relatively inexpensive and easily applied to a spring assembly.

Another object is to provide a form of tie wire connection which uses a minimum of material and wire of less costly grade than that now usually required.

A further object is to provide a dependable tie wire formation which is free from projections or sharp edges which, after a period of use, might puncture the upholstery covering the spring assembly.

A still further object is to provide a tie wire connection for securing adjacent coil springs together in a spring assembly in a firm manner while at the same time permitting enough movement between the coil springs so that the assembly provides a comfortable yielding support.

In one embodiment of the invention, these objects are achieved by overlapping the outer turns of adjacent coil springs in each row of a spring assembly, by inserting tie wires underneath the outer turns of the springs where they overlap, by forming generally U-shaped loops in each tie wire where it extends next to the overlapped turns of the coil springs, passing the loops of the tie wire upwardly through the openings between the intersecting arcs of the overlapped coil springs in each row and wrapping or twisting the loops in a single direction over and around both turns where they overlap. The material used for the tie wire is of a kind less costly than that usually required for such purposes, while the frame members and coil springs of the assembly may be of standard materials and forms.

Other objects and further details of that which is believed to be novel and included in this invention will be clear from the following description and claims, taken with the accompanying drawing in which is illustrated an example of spring assembly embodying the present invention and incorporating the improved tie wire with loop wrapped in a single direction.

In the drawing:

FIG. 1 is a fragmentary plan view of a corner of a spring assembly according to the invention showing how a tie wire secures together two coil springs in one row of such springs in the assembly;

FIG. 2 is an enlarged sectional view taken on the line and in the direction of the arrows 2—2 of FIG. 1;

FIG. 3 is a side view as if seen looking from the left-hand side of FIG. 2;

FIG. 4 is another side view as if seen looking from the right-hand side of FIG. 2;

FIG. 5 is a perspective view of a section of the tie wire

alone, showing the U-shaped loop in the tie wire after it has first been formed, but before it is wrapped or twisted around the turns of coil springs;

FIG. 6 is a perspective view like FIG. 5, but showing the U-shaped loop as it will appear after the first part of the wrapping has taken place; and

FIG. 7 is another perspective view showing the loop as it will appear completely formed; that is, after it has been wrapped entirely around the two turns of the coil springs.

A spring assembly according to this invention usually includes an outer frame **10** of relatively stiff heavy wire. After the spring assembly is completed, it is intended to be covered with upholstery. There is often both an upper and lower frame in spring assemblies of the kind here contemplated, and the same construction is used on each side of the assembly. Only one side will be shown and described. In known fashion, helical wires **12** may be used to hold the outer circular turns **14** and **16** of the usual coiled springs **20** and **22** to the frame. Tie wires **18**, of which there is a part of but one shown in FIG. 1, are used to fasten the turns **14** and **16** together in overlapping relation and to space similar rows of coiled springs from one another. It will be noted that the tie wire **18** preferably extends under the overlapping portions of both the coil turns **14** and **16**.

In order to secure the overlapped circular turns **14** and **16** together, a U-shaped loop with a bend or bight **24** is provided in the tie wire **18** wherever this tie wire passes under an opening **25** formed by the intersecting arcs of the overlapping portions of turns such as **14** and **16** in spaced rows of coiled springs. The coiled springs like **20** and **22** may be of a usual standard double-conical type. In the tie wire the bight **24** may be formed by bending the wire **18** first, before passing it upwardly through the opening **25**, or the bight may be formed by forcing or drawing a part of the wire **18** through the opening between the overlapping turns of the coil springs, the formation of the bight being simultaneous with its passage through the opening.

In a geometrical sense, it may be noted that the overlapped end turns **14** and **16** form intersecting arcs, one turn forming one side and the other turn forming the other side of the lenticular or pointed elliptic opening **25**. The straight parts of the tie wire **18** extend parallel to the major dimension of the opening **25** and in plan view the tie wire is chordal to both the arcs where they intersect.

In wrapping or twisting the loop to secure the coils together, the legs of the loop are first passed upwardly through the opening **25** and then laterally over the upper (most remote) overlapping turn **16** as at **26**, then downwardly outside of the opening **25** and turn **16**, around, under and outside the lower turn **14** as at **28**, and then back up and at least partly over the turn **14**, where the bend or bight of the loop **24** holds this turn in place. Note that when this loop was wrapped or twisted around the coil turns it was moved in but a single direction of rotation through substantially 360°. This unidirectional wrapping or twisting lends itself readily to simple tools or machines for performing the operation. No difficult manipulation of the tie wire is necessary in order to complete a firm connection between adjacent coil springs in the assembly. There is a limited hinging action possible between the joined turns of adjacent coil springs, but this

is sufficient to allow compression of the coil springs while holding them in proper position firmly anchored with respect to one another.

It is to be understood that the tie wire **18**, beyond the single twisted loop shown in FIG. 1, extends in a straight section as at **30** approximately to the center line of a next row or bank of coil springs in the frame (not shown), where similar overlapping turns are secured together by a similar loop wrapped in a similar fashion around the turns. The straight sections between the twisted loops of course determine alignment of the rows of coil springs in properly spaced relation, the loops holding the rows apart as well as joining together a pair of adjacent coil springs within one row of the assembly.

The form of loop used in the tie wire according to the present invention is very economical of the amount of wire used. Furthermore, it has been found possible according to this invention to use for the tie wires an ordinary commercial grade spring wire which, because it requires no clinching, may be relatively soft compared to the usual material used for tie wires. Because the bight of the loop is round and smooth, it presents no sharp edges which might damage upholstery applied outside of the spring assembly.

It should also be noted that the tie wire proper is located preferably on the inner or underside of the lower one of the overlapping turns, thus avoiding the formation of objectionable ridges in the upholstery surrounding the spring assembly by the projection of extensions **30** into the mass of upholstery. However, if a stiffened reinforcing layer of material is used between the spring assembly and the upholstery covering it, the tie wires might be located on the upper or outer side of the overlapping turns without objection. In that case the loop would be wrapped first around the inside or lower one of the overlapping turns, this being the turn most remote from the tie wire proper.

Referring to the preferred form shown, the fact that the tie wire loop first passes upwardly through the lenticular opening **25** positively prevents shifting of the turns in a horizontal direction away from each other. In order to insure the locking action which prevents movement of the overlapping turns away from each other in a horizontal direction, the loop should pass through the opening **25** until it is beyond the uppermost or most remote one of the two turns. Then the wrapping or twisting of the loop should start in a lateral direction radially outside of (away from the center of) that uppermost turn and radially inwardly of (toward the center of) the other turn, which is lowermost and nearest the tie wire. The straight portions of the tie wire extending on either side of the loop underlie portions of both turns and support them. Therefore, where the loop passes over the top of the uppermost turn **16**, as at **26**, it acts as a hook and limits movement of both turns away from the tie wire in an upward direction. The portions of the loop which pass over the outside circumferences of the turn **16** and turn **14** hold these turns and their respective coils against shifting any further toward each other in a horizontal direction. By continuing to wrap the loop around until its bight lies at least partly over the lowermost turn **14**, and near the beginning of the loop, the tie wire proper is prevented from twisting when the spring assembly is in use because the loop is thus hooked over and prevented from swinging away or becoming disengaged from that turn.

As will be evident from the foregoing description, certain aspects of this invention are not limited to the particular details set forth as an example, and it is contemplated that various and other modifications and applications of the invention will occur to those skilled in the art. It is therefore intended that the appended claims shall cover such modifications and applications as do not depart from the true spirit and scope of this invention.

What is claimed as new and is desired to be secured by Letters Patent of the United States is:

1. In a spring assembly of the type including spaced rows of coil springs with outer circular turns of adjacent springs overlapping one with another in each row to form a lenticular opening where the arcs of each pair of said turns intersect, that improvement in means for joining the overlapping circular turns of a pair of adjacent springs in one row together and for holding joined springs of one row spaced from those of the next row, comprising a straight tie wire extending under said openings and having U-shaped loops spaced apart therealong coinciding with the desired spacing between centers of said spaced rows of springs, each loop extending upwardly through one said lenticular opening between overlapping outer turns of a pair of adjacent coil springs in one row and being wrapped unidirectionally around both said outer turns where they overlap, first radially outside the overlapping circular turn most remote from said tie wire and forming one side of said opening, then downwardly and laterally under and across said opening, then upwardly outside the circular turn nearest said tie wire and forming the other side of the opening with the bight of the loop hooked over the last-named circular turn.

2. In a spring assembly of the type including spaced rows of coil springs with outer circular turns of adjacent springs overlapping one with another in each row to form a lenticular opening where the arcs of each pair of said turns intersect, that improvement in means for joining the overlapping circular turns of a pair of adjacent springs in one row together and for holding joined springs of one row spaced from those of the next row, comprising a straight tie wire having U-shaped loops spaced apart therealong coinciding with the spacing between centers of said spaced rows of springs, each loop extending through one said lenticular opening between overlapping turns of a pair of adjacent coil springs in one row and being wrapped unidirectionally around both said turns where they overlap, first outside the overlapping circular turn most remote from said tie wire and forming one side of said opening, then across said opening and finally outside the circular turn nearest said tie wire and forming the other side of said opening.

3. In a spring assembly wherein there are a plurality of series of coil springs and an end turn of one of a pair of adjacent coil springs in a series of springs overlaps the end turn of another spring forming intersecting arcs, a tie wire extending under both the overlapping turns and chordal to both the intersecting arcs, an elongated U-shaped loop in the tie wire extending upwardly through the space formed within the intersecting arcs, then first radially outwardly over the uppermost overlapping turn, then around and beneath both overlapping turns, and around the lowermost overlapping turn with the bight of the U again extending in the first mentioned radial direction and adjacent and above the start of the loop, said tie wire being continued across said spring assembly to an adjacent pair of overlapping turns, with a U-shaped loop in the wire identically extending between and around the overlapping turns of said adjacent pair.

4. In a spring assembly wherein an end turn of one of two adjacent coil springs overlaps the end turn of the other forming intersecting arcs, a tie wire extending across both the overlapping turns and chordal to both the intersecting arcs, an elongated U-shaped loop in the tie wire extending through the space formed within the intersecting arcs, then first radially outwardly across the overlapping turn most remote from said tie wire, then around both overlapping turns in the opposite direction, and finally around the overlapping turn nearest said tie wire with the bight of the U again extending in the first mentioned radial direction and adjacent the start of the loop.

5. A tie formation for overlapped circular turns of coil springs which form a lenticular opening where their circumferential arcs intersect, comprising a tie wire with generally straight portions extending next to and across said overlapped turns, parallel to the major dimension of

said opening, a U-shaped loop in said wire with legs extending through said opening, the legs of the loop further being wrapped around both said overlapped turns in a single direction with the bight of the loop hooked over the circular turn which is next to the straight portions of the tie wire, whereby to hold both turns against any but limited movement relative to each other and said tie wire.

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