June 9, 1953 D. I. LEVINE 2,641,758

SPRING COIL FOR CUSHIONS, MATTRESSES, AND THE LIKE

Filed June 24, 1948

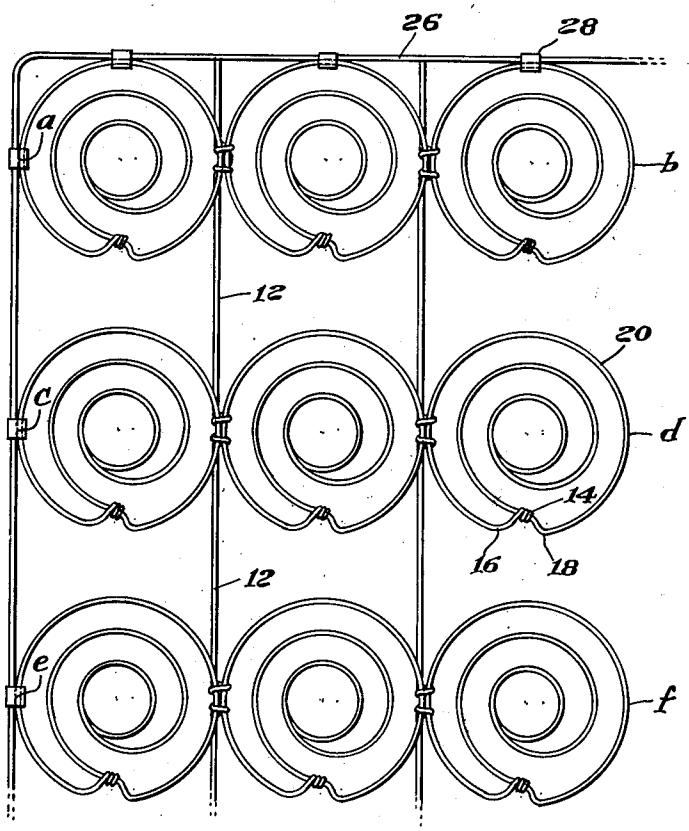


Fig. 1

Fig. 2

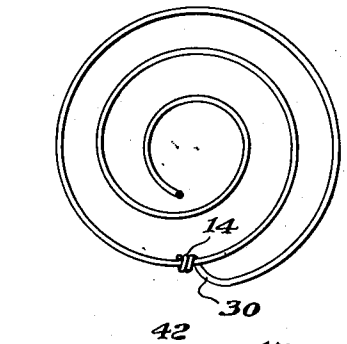
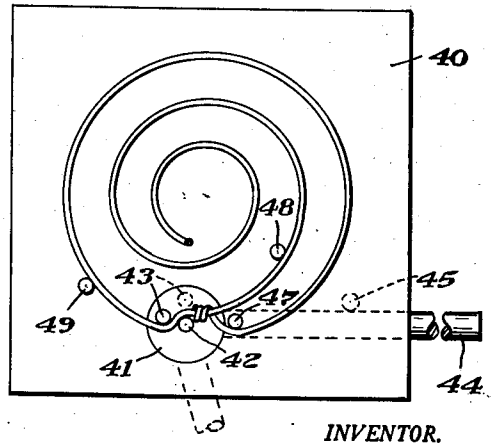


Fig. 3



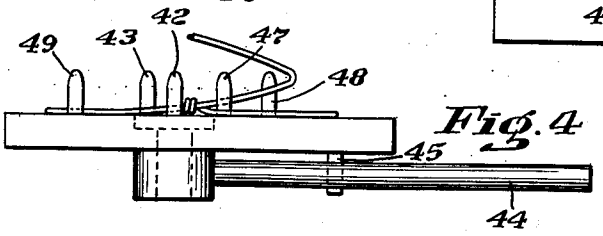


Fig. 4

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SPRING COIL FOR CUSHIONS, MATTRESSES, AND THE LIKE

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1 Claim. (Cl. 5—256)

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This invention relates to coil springs and more particularly to springs of the type used in the manufacture of cushions, mattresses or other spring constructions.

While spring units formed of groups of these coil springs bound together by tie-wires have been widely used in mattress and cushion manufacture, they are the cause of considerable difficulty in the manufacture of so-called pre-built mattresses. Old style mattress-making usually involved sewing a mattress cover into bag form and then inserting a spring unit together with surrounding upholstery material into the bag and closing the bag. In this operation there was an opportunity to remedy differences in the over-all lengths of spring units, having an equal number of coils by using different amounts of filling material. More recently, to lessen the amount of hand labor, mattress-making methods have involved placing the spring unit on an unsewn flat mattress cover and then sewing the covering around the spring unit with machinery. In this method there is no opportunity for compensating with filling for variation in the lengths of the spring units with the result that one unit will be too long and the cover will not stretch over it and the next unit will be too short and the cover will be too loose, ill-fitting and unsightly. Rejects have become common and spring unit manufacturers now must give careful attention to the uniformity in the length of the spring units so that the preformed covers will properly fit.

Coils such as shown in my prior Patents No. 2,116,796 and 2,197,131 have end convolutions of non-uniform radius. This causes considerable differences in the over-all dimensions of the rows, because the knots of successive coils are not exactly placed with respect to the tie points.

Furthermore, when such coils are made, the knots on the top and bottom do not exactly overlie each other, because the heat-treating of the formed coils causes a twisting of the coil so that the knots are offset from each other. When then, the coils are placed in rows with their convolutions juxtaposed, the over-all dimension is affected by the position of the knots which is seldom uniform. When it is considered that there may be anywhere from 18 to 22 coils in a row designed for use in making a double-bed mattress having an over-all dimension of 52" by 73½", one can understand the variation that occurs.

Furthermore, since as above explained, knots in the bottom convolutions are not directly beneath knots in the top convolutions, parallel

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diameters across the two end convolutions are unequal. This causes the lengthwise dimension of a row along the bottom to be different from the lengthwise dimension of a row along the top so that the end contours of the spring unit will not be parallel and rectangular but tend to offset at the level of greater dimension.

Springs of this invention are composed of coils, the end convolutions of which are of uniform radius throughout substantially their entire extent and excepting only in a small sector adjacent the knots. Since tying operations are always made away from the knot, the perfect circular shape of the remaining portion of the coils insures that uniform dimension lengthwise of the spring unit, is provided across every coil although the knots may not lie in the exact same positions relative to the diametrically opposed tying points of the coil; the assembler need not pay any attention to just where the knot falls so long as it is somewhat removed from the tying point. As the dimension is multiplied by the addition of coils, the total lengthwise dimension of the row will be an exact multiple of the uniform diameter of the end convolutions and each row and all the rows both across the top and across the bottom will be of uniform lengthwise dimension. Variation in length of the units and offsetting, horizontally or vertically, is thus avoided to provide a spring unit of precise length and perfect rectangular outline.

The perfect circle coil of the invention has its knot recessed radially inwardly an equal distance from both extremities of the main arc of the circle as shown in the accompanying drawings wherein:

Fig. 1 is a representation of several rows of coil springs tied into a spring unit;

Fig. 2 is a representation of the lower portion of a conventional spring unit of the type formed by coil forming machinery, before it is modified in accordance with this invention;

Fig. 3 is a representation of one of the coils of Fig. 2 after it has been modified in accordance with the present invention by the use of a suitable instrumentality which is shown in elevation in Fig. 4.

The springs shown in Fig. 1 are of the conventional hour-glass or double cone type and are juxtaposed in a series of rows, which rows are held in properly spaced relation by tie-wires 12. Such tie-wires may be of any suitable type, the one shown in the drawings being similar to that described in my Patent No. 2,116,796, although obviously the type of tie-wire shown in my Patent

No. 2,197,131 or other type could be equally as well used. The end convolutions shown in Fig. 2 include the conventional knots 14 but it is noted that these knots are recessed inwardly from both extremities 16 and 18 of a remaining arc of the convolution 20 which is of substantially uniform radius throughout. The radius of the arc 20 is therefore equal between the points 16 and 18. It will thus be seen that the dimension from *a* to *b* will be exactly the same as the dimension from *c* to *d* and the dimension from *e* to *f*, being the third multiple of the uniform diameter of the end convolutions.

Such a group of coils as shown in Fig. 1 may have an end and side frame 26 to which the adjacent coils may be connected by clips 28, or any other suitable border element or rim of the type heretofore utilized may be substituted.

Because of the availability of coil springs the end convolutions of which are spirally, as contrasted with circularly shaped, I have found it convenient to modify the shape of such a coil convolution, as shown in Fig. 2, by forming an offset in the end convolution which will take substantially the form of and be more or less symmetrical with the existing portion 30 of the end convolution immediately adjacent the knot 14. This may be conveniently done with the use of a device of the type shown in Figs. 3 and 4 which comprises a frame 40 having counter-sunk therein a rotatable turret 41 on which are mounted two pins 42 and 43, the pin 42 being coaxial with the axis of the turret. A handle 44 is provided so that the turret 41 may be rotated through a limited arc from the position wherein the pin 43 is in the dotted line position of Fig. 3 to the full line position of Fig. 3. A stop 45 may be provided beneath the frame 40 for limiting the movement of the handle 44.

The frame 40 is also provided with upstanding pins 47, 48, and 49 to act as retaining means to prevent relative rotation of the spring relative to the frame 40 during the bending motion of the turret.

With the handle 44 moved clockwise from its position as shown in full lines in Figs. 3 and 4 to a position to bring the pin 43 to its dotted line position of Fig. 3, the lower end convolution of a coil, as shown in Fig. 2, is placed on the frame 40 with the knot 14 adjacent the pins 42 and 43 and with the section of the end convolution immediately clockwise adjacent the knot 14 extending between the pins 42 and 43 and substantially perpendicular to a plane extending through the axes of the pins 42 and 43

in that position. The pin 47 extends upwardly inside the end convolution whereas the pin 48 is inside the next convolution and the pin 49 is outside the end convolution. The handle is then rotated to the full line position of Fig. 3 causing a kink or reversed bend to be formed in the end convolution, the pins 47, 48, and 49 retaining the coil against movement during this motion of the handle.

The spring may then be turned over and the same procedure followed to form an identical bend in the other end convolution of that spring.

In this manner the springs on both ends may be brought to the contour as shown in Fig. 1 with the advantages when assembled in a spring unit previously described.

I claim:

A double-cone coil spring constituting a length of conically wound wire terminating in end convolutions representing the bases of the cones, each end convolution having an inturned portion near the free end thereof and the free end knotted upon a spiral portion of the wire at a point substantially 360° removed from said inturned portion, and each end convolution having an S-shaped bend on the other side of the knot from the inturned portion but closely adjacent the knot, to prevent said knot from sliding outwardly on the spiral portion of the wire and the entire portion of each end convolution between its inturned portion and its S-shaped bend being of substantially uniform radius to form a substantially complete circle, said knot being positioned inwardly substantially an equal distance between both extremities of the main arc of the circle.

DAVID I. LEVINE.

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