

(Model.)

4 Sheets—Sheet 1.

J. L. WELLS.

SPRING.

No. 336,774.

Patented Feb. 23, 1886.

Fig. 1.

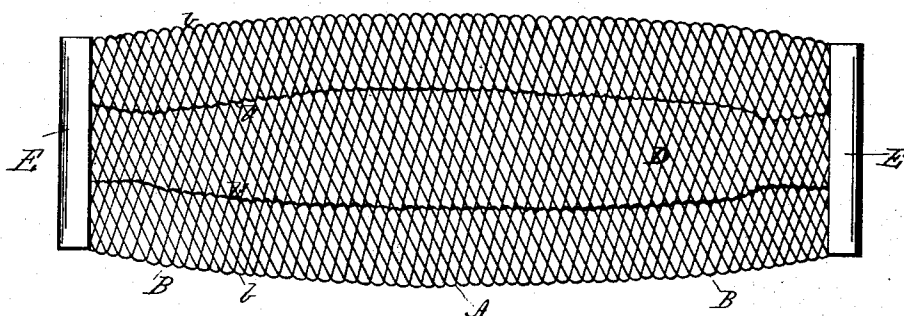
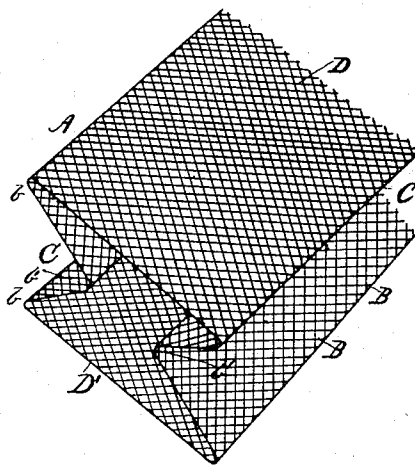


Fig. 2.



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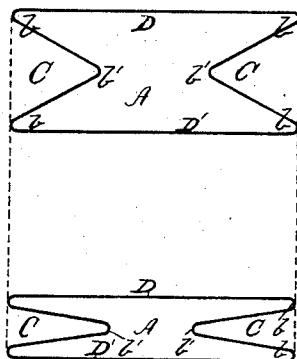


Fig. 3.

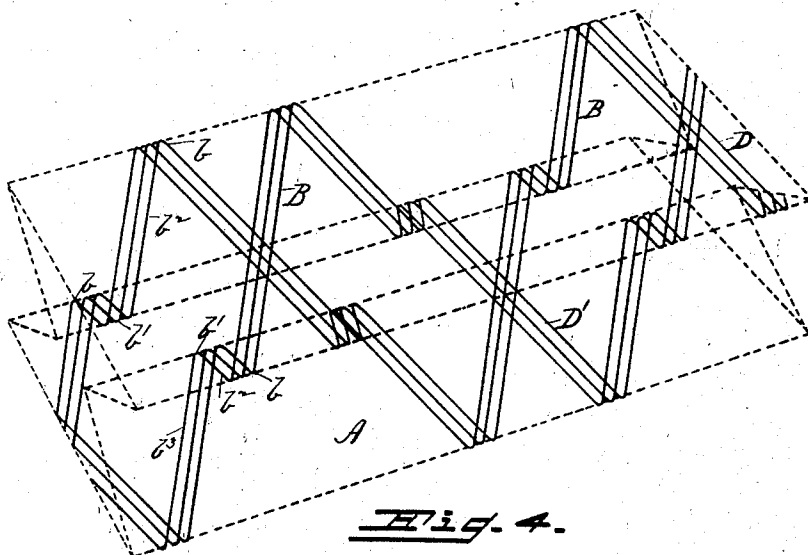


Fig. 4.

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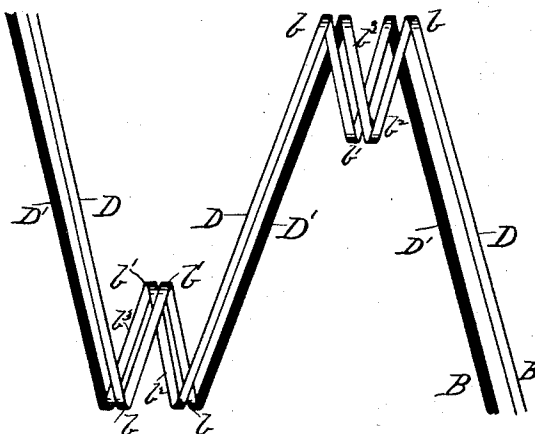


Fig. 5.

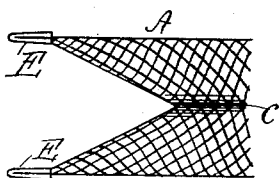


Fig. 6.

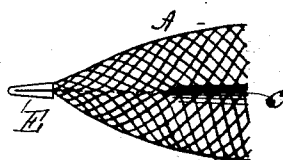


Fig. 7.

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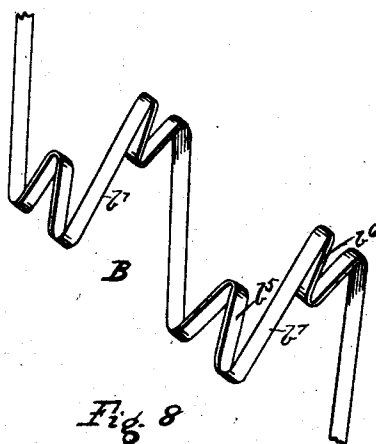
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UNITED STATES PATENT OFFICE.

JOSEPH L. WELLS, OF PHILADELPHIA, PENNSYLVANIA.

SPRING.

SPECIFICATION forming part of Letters Patent No. 336,774, dated February 23, 1886.

Application filed October 3, 1885. Serial No. 178,914. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH L. WELLS, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Springs; and I do hereby declare the following to be a full, clear, and exact description of the invention, reference being had to the accompanying drawings, which form part of this specification, in in which—

Figure 1 is a plan of a complete spring, showing fastening end plates. Fig. 2 is a perspective of a section or piece of spring. Fig. 3 is a diagram showing an outline of end of spring open and also as compressed. Fig. 4 is a perspective of skeleton spring. Fig. 5 is a detail showing course of wires. Fig. 6 is a detail showing end fastening, and Fig. 7 a modification thereof. Fig. 8 is a perspective of a single wire of the spring showing the course and bends of the various wires of the latter.

My invention has for its object to provide a new form of spring specially adapted for upholstery purposes or for use in the seats and backs of chairs, car-seats, sofas, lounges, and other similar articles of furniture, and for cushions.

Heretofore spring-seats of chairs and other articles of furniture have involved the use of spiral springs placed some distances apart and held in positions relative to each other by cords, and to prevent the contact of said springs with the covering material hair or other packing has been placed between the springs and the covering.

In order to obtain the necessary resiliency and extent of motion, the spiral springs heretofore used have been made pretty deep or long—in practice, about or more than four inches—which, with the packing required with them, necessitated considerable space; hence, in practice, the seats only of furniture have been made with springs, and only chairs with deep seats or bottom spaces have been so upholstered.

The backs of chairs have been generally upholstered with hair or other equivalent packing, no springs ordinarily being used, even where the seats have been provided with springs, and many kinds of chairs have not

been made with upholstered seats, because the latter were not deep enough to receive the spiral springs heretofore employed in this connection.

By my invention I now supply a new form of spring which will have as much resiliency as the spiral spring heretofore used, while occupying less space than the latter, and which may be used without hair or any other packing.

My invention consists, essentially, of a spring composed of a braided, plaited, or woven wire cylinder or tube longitudinally corrugated or grooved, as hereinafter set forth.

In carrying my invention into effect I first produce a cylinder or tube of braided, plaited, or woven wire. This is preferably done on a braiding or plaiting machine which produces a seamless cylinder; but the desired result may be achieved, though, perhaps, less effectively, by bending a sheet of woven wire into cylindrical or tubular form and soldering or otherwise securing the edges. This cylinder or tubular piece is then longitudinally corrugated or grooved on two of its opposite sides. There may be only a single groove on each side or there may be two or more grooves or corrugations in each. The grooved or corrugated sides may be considered the edges of the spring. The remaining two opposite sides may be left plain and be curvilinear, or they or either of them may be made flat.

The spring thus made has peculiar characteristics, as follows: It may be made of soft or untempered wire, and yet will possess a remarkable amount of resiliency and elasticity. It may have a depth of only about one-half or less than one-half that of the spiral springs heretofore used for upholstery purposes, and yet will have all the yielding motion or "give" necessary for the purpose in the seats of chairs and similar articles of furniture.

When a series of my improved springs are placed together edge to edge to form the spring portion of the seat or back of an article of furniture, they will not require to have any such material as hair or packing placed between them and the covering. They may be covered directly with the outside covering or with the muslin or "white" that is generally used in upholstery.

Referring to the accompanying drawings, A represents a spring which embodies the

principles of my invention. Said spring is composed of wires B B, which are braided or plaited together, as shown, (or which may be interwoven,) and in the first place are combined in the form of a hollow cylinder or tube of any desired shape in cross-section. This cylinder or tube is corrugated or grooved on two of its opposite sides, as shown at C C, there being a single groove or corrugation formed on each side, or two or more such grooves or corrugations on each side, as may be preferred. The other two sides, D D', which form the spring bottom and top when in use, may be left plain or ungrooved, and if it be desired to obtain a flat surface for such top and bottom, or for either of them, they, or one of them, may be flattened. The groove in each side of the wire lies between the edges *b b*, the bottom of the groove being indicated at *b'* and the parts of the wires lying between the edges *b b* and the bottom *b'* of the grooves being indicated by the letters *b² b³*.

When a series of these springs are placed together to form the entire spring portion of a chair seat or back or other like or equivalent part of any article of furniture, their edges or grooved sides should be together and may be in contact, so as to fully occupy or fill up the spring-space in such seat or back, and yet when weight or impact is imposed on the springs, as when one sits down on the seat or leans against the back, the springs will not widen, as the corrugated portion or groove yields or gives inwardly and the width of the spring remains the same, or substantially the same, whether open or compressed. This feature of the spring is illustrated in the diagram Fig. 3, wherein the upper portion of the figure represents the spring as open or in its normal condition, and the lower portion the spring in a state of compression. The vertical lines on either side of the figure represent the planes of the edges, and it will be observed that these remain the same, while the inner edges or bottoms of the grooves come closer together when compressed than when the spring is open.

A chair seat or back composed of a series of these springs differs from a seat or back having a series of spiral springs in the following particulars: My springs are individually unlike ordinary spiral springs, and when combined as described their axes are in a plane parallel, or approximately parallel, with the plane of the seat or back, while the spiral springs heretofore used are placed in the seat, where they are used in planes which cause their axes to be transverse or perpendicular to the plane of such seat. It will be noted that the wires constantly cross and recross each other, as in all braided or plaited wire cylinders or tubes, and that they are diagonal with respect to the longitudinal axis of the cylinder as a spiral is with respect to its axis; but it should be further observed as constituting an important feature of my invention that, by reason of the grooving or corrugating, the direction of each wire is

reversed at the bottom of each corrugation or groove—that is, that each wire is caused to travel or tend toward the axis of the spring and then lead outwardly therefrom. This will be seen by following a single wire, as in the view Fig. 4.

The described construction of the spring—namely, the corrugation or grooving of a spirally braided, plaited, or woven cylinder or tube—has the effect that when the spring is compressed by pressure perpendicular to its longitudinal axis torsion is produced in the wires composing it. This torsion results from the fact that the grooving or corrugating of the sides of the cylinder or tube produces bends or deflections in the wires, the bends on one side of any wire or one side of the spring being in the reverse direction from the bends on the opposite side. For example, referring to Fig. 8 of the drawings, the bend *b⁵* on one side is in the reverse direction from the bend *b⁶* on the opposite side. Now, when pressure perpendicular to the longitudinal axis of the spring is imposed upon the top of the spring or part *b'*, which extends between the bends *b⁵* *b⁶*, the bends tend to spread or diverge in opposite directions—that is, one bend to sway or trend toward one end of the spring and the other bend to sway or trend in the opposite direction, producing a motion or effect equivalent to a twist or torsional action of the wire.

In order to make more clearly apparent the relation of the wires to one another, I have shown the spring in Fig. 5 skeleton in form and as composed of few wires, widely separated at different parts of the structure; but in practice the springs will be quite close together and equidistant, as shown in Fig. 2.

Although a very good spring for upholstery purposes may be made of soft or untempered wire, yet for some kinds of springs it may be desirable or expedient to use tempered wire; hence my invention is not confined to the particular quality of wire used.

Where a very stiff spring is required, several thicknesses or layers of wire may be used, and this result may be obtained by braiding or plaiting the wires over each other in successive layers or strata.

The ends of the spring may be tapered or diminished in depth or width; or such ends may be left the full dimensions of the body of the spring, and in either case said ends may be fastened in any suitable manner, as by securing them in metallic clamping-plates *E E*, which latter will not only prevent the “fraying” of the wire, but will afford means of fastening the springs to the frame of the chair or other article of furniture to which they may be applied.

What I claim as my invention is as follows:

1. A spring composed of a series of braided, plaited, or woven wires, each of said wires having divergent bends on opposite sides, said bends following the diagonal course of the wires and being from the outside of the spring toward its longitudinal axis, whereby when

pressure perpendicular to said axis is imposed on the spring torsion is produced in the wires thereof, substantially as shown and described.

2. A spring composed of a braided, plaited, 5 or woven wire cylinder or tube having two opposite sides longitudinally grooved or corrugated, whereby the wires thereof have divergent bends or deflections on opposite sides, and pressure on the top of the spring and perpendicular to its longitudinal axis produces 10 torsional action of the wires, substantially as shown and described.

3. A spring seat, back, or support for chairs or other articles of furniture, composed of a 15 series of springs each of which consists of a cylinder or tube of braided, plaited, or woven

wire, with their sides longitudinally grooved or corrugated, the course of the wires being diagonal with relation to the longitudinal axis of the cylinder or tube, said springs having 20 their axes parallel or approximately parallel with the plane of the seat or support which they form, substantially as shown and described.

In testimony that I claim the foregoing I 25 have hereunto set my hand this 29th day of September, 1885.

JOSEPH L. WELLS.

Witnesses:

R. DALE SPARHAWK,
WILL H. POWELL.