June 6, 1939. J. C. HIRSCHMAN 2,161,165

WIRE SPRING STRUCTURE

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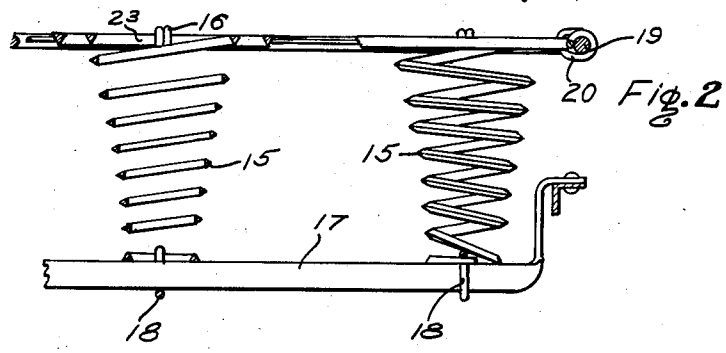



Fig. 2

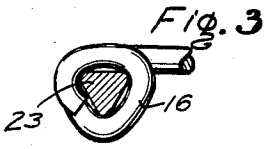



Fig. 3

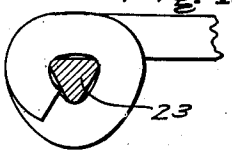



Fig. 4

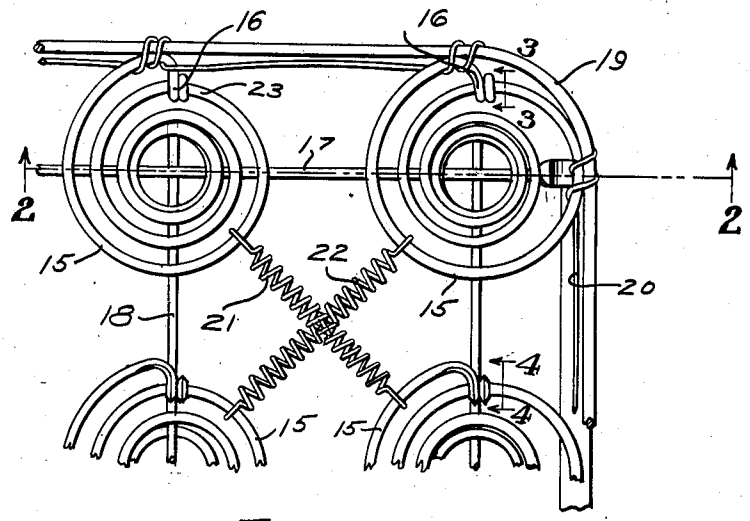



Fig. 1

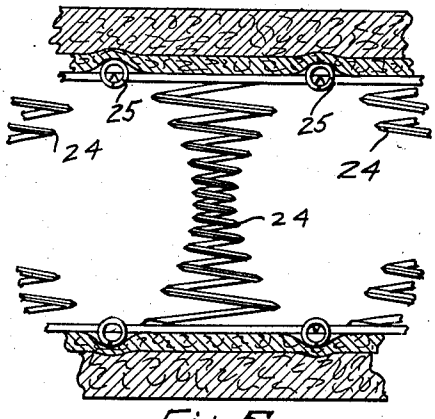



Fig. 5

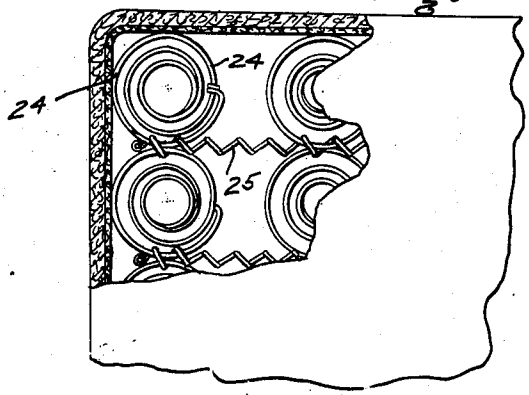



Fig. 6

Inventor

J. Clifton Hirschman,

By Minturn & Minturn,

Attorneys

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WIRE SPRING STRUCTURE

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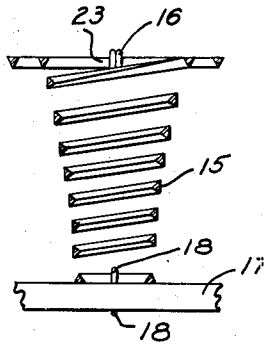



Fig. 7

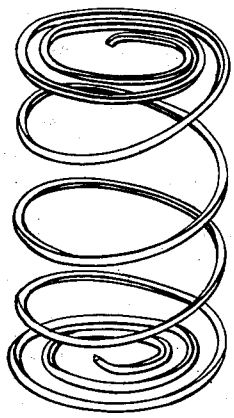


Fig. 10

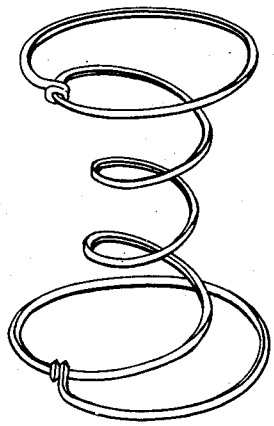


Fig. 8

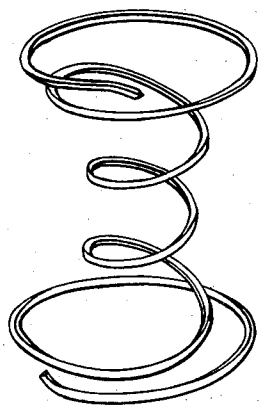


Fig. 9

Inventor
J. Clifton Hirschman,
By Minturn & Minturn
Attorneys

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# UNITED STATES PATENT OFFICE

2,161,165

## WIRE SPRING STRUCTURE

Jerome Clifton Hirschman, Indianapolis, Ind.

Application July 21, 1937, Serial No. 154,697

1 Claim. (Cl. 267—1)

This invention relates to spring construction primarily of the type employed in general upholstery work, foundation springs, bed springs, box mattresses, inner spring mattresses, etc. The invention includes an individual spring unit in any of the various forms now generally applied and well known, such as the conical type, hour glass type, and the barrel or cylinder type.

The primary object of the invention is to provide a spring unit which may have a flat upper surface as opposed to the heretofore well known round wire spring and at the same time have the cross-sectional shape of the wire uniform throughout the spring from the upper top surface down through the body without having to employ round wires between the upper surface and the body proper.

A further important object of the invention is to provide a cross-sectional shape of wire making up the spring, which will permit proper vertical resiliency but which will resist side bending or distortion to a greater degree than will a round or flat wire.

These and many other objects and advantages of the invention will become apparent to those versed in the art from the following description of the invention as illustrated in the accompanying drawings, in which:

Fig. 1 is a top plan view of a corner of a spring construction embodying my invention;

Fig. 2, a vertical section on the line 2—2 in Fig. 1;

Fig. 3, a detail in vertical section on the line 3—3 in Fig. 1;

Fig. 4, a similar detail in modified form;

Fig. 5, a detail in vertical section through an inner spring mattress embodying my invention;

Fig. 6, a detail in top plan view of a corner of the inner spring mattress;

Fig. 7, a central vertical section through a spring unit;

Fig. 8, a perspective view of an hour glass spring embodying my invention;

Fig. 9, a perspective view of an hour glass spring embodying the invention but having free ends; and

Fig. 10, a perspective view of a barrel or cylindrical spring.

Like characters of reference indicate like parts throughout several views in the drawings.

Referring first to Figs. 1–4, a conical spring generally designated by the numeral 15 is formed to have a number of the upper convolutions of the spring in the same plane and to have the end of the spring wire twisted around an inner loop to form a knot 16. The lower end of the spring, as in the form shown in these views, is flat to rest upon the cross bar 17 of the spring frame. The lower ends of the individual springs 15 are secured to the bar 17 in the usual manner by the longitudinal tie wires 18 which come over the upper side of the bottom of the convolutions of the spring, go down and around the bar 17 and then up and over the other top side of that bottom convolution. The upper ends of the various marginal springs 15 are tied to the upper frame boundary wire 19 by means of a tie wire 20, all in the usual and well known manner. The springs spaced inwardly from the marginal row have the top ends yieldingly tied one to another by means of the helical springs 21 and 22 crossing each other at substantially right angles and hooking over by their outer ends the outer convolutions of the tops of the springs as indicated in Fig. 1.

An important feature of the spring structure above described, is that the wire forming the individual springs 15 is triangular in cross-section. The spring is so formed from this triangular wire that the upper convolutions have the wire turned to present flat faces upwardly so that the coverings over the springs may rest on these flat surfaces. Moreover by having the flat faces turned up and the apex of the triangle pointed downwardly, this position of the section sets up spring surfaces which normally resist the bending of the wire itself out of a horizontal plane at any point of its length therein.

In going from this flat upper end of the spring, the triangular wire needs be twisted but very slightly to present a flat face in parallel alignment with the vertical axis of the spring and this is the desired position of the cross-section of the wire throughout the body portion of the springs down to the lower convolutions in which the triangular wire is again twisted slightly to present flat surfaces resting on the cross bar 17.

While the wire in the body of the spring 15 is shown to have a flat face presented inwardly in Fig. 2, this position may be reversed to have the flat face turned outwardly but still in substantial parallelism with the vertical axis as indicated in Fig. 7. In fact it may be the preferred form in Fig. 7, so that the outer part of the spring in general will have the flat side of the wire turned outwardly with no sharp edges. In any event, by positioning the wire throughout the body of the springs to have flat faces of the triangular section in parallel alignment with the axis, the apex of the triangular section is turned horizontally away from that face and the triangular spring

wire itself sets up a resistance to lateral bending or buckling as sometimes happens in employing the heretofore round or flat wires. Furthermore since there are but three faces to the triangular wire, there is no need to have the heavy round section between the body of the springs and the top or lower ends in order to get the body wire turned properly since the wire needs be twisted less than 90 degrees to make the turn.

As indicated in Fig. 3, the free end of the spring wire in the outer convolution may be left round where the knot **16** is formed about the triangular wire **23**. However, the preferred form of the tie ends of the wire is as shown in Fig. 4, wherein the triangular section is carried entirely out to the ends of the springs and is twisted around the next inner convolution to form the tie knot. In this formation, the flat side of the wire is turned into contact with the wire about which the end is wrapped.

As indicated in Figs. 5 and 6, the invention is equally well adapted to the hour glass type of springs. In this form the upper and lower ends of the individual springs **24** are so formed as to have the triangular wire turned to present flat surfaces thereacross. These individual springs are tied one to the other by means of the transverse helically coiled wires **25**.

In Fig. 8, the triangular wire is shown formed in the closed end of the hour glass type of springs, wherein the wire is turned to present flat upper and lower faces on the respective spring ends with the intervening convolutions having a flat face turned parallel to the spring axis. The same form holds true in Fig. 9, wherein the only difference is that the end of the spring wires are not tied but left free, for use in such instances where the ends are tacked to some supporting member.

In the form shown in Fig. 10, a flat face of the triangular wire is turned outwardly to form the respective ends of the springs, whereas the wire is then twisted slightly to have the flat faces carried into parallel alignment with the vertical axis throughout the intervening vertical convolutions.

While I have herein shown and described my invention in the forms as now best known to me, it is obvious that structural changes may be made without departing from the spirit of the invention and I therefore do not desire to be limited to those precise forms beyond the limitations as may be imposed by the following claim.

I claim:

A coil spring formed of a wire triangular in cross-section curved into a plurality of convolutions about a common axis; the wire throughout the major convolutions being turned to have a flat face parallel with that axis, said wire being carried around from said convolutions in continuous triangular cross-section by an axial twist to terminate in a plurality of end convolutions with a flat face of the wire turned outwardly to bring the outer flat surfaces of those end convolutions into a common plane, said end convolutions being triangular in cross-section with the same area as that of the major convolutions.

J. CLIFTON HIRSCHMAN.