Jan. 13, 1931. D. T. OWEN 1,789,154

SPRING MATTRESS, ETC

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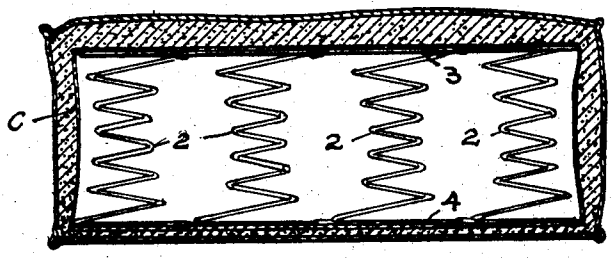
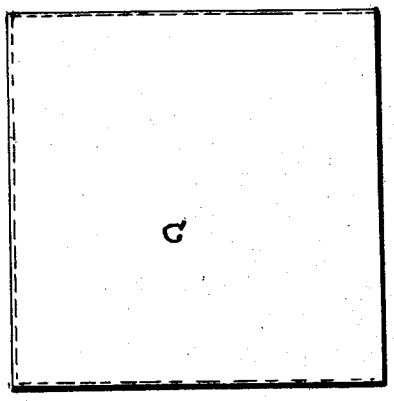


Fig. 1

Fig. 2



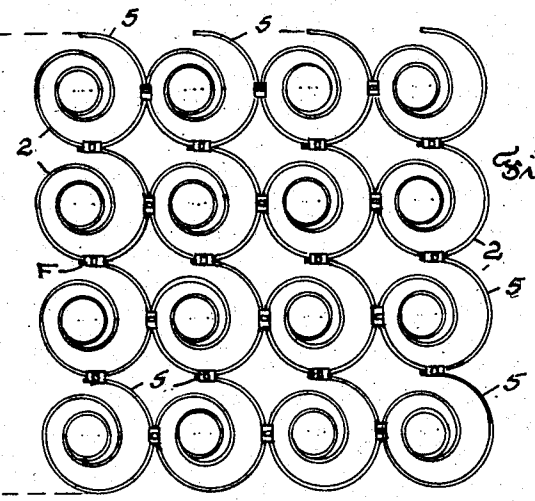
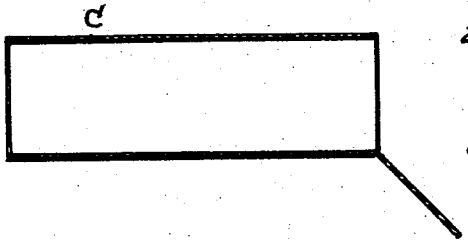


Fig. 3

Fig. 4



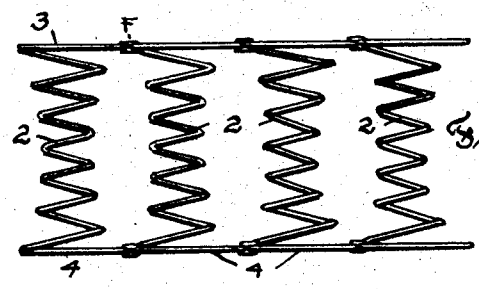


Fig. 5.

Fig. 6.

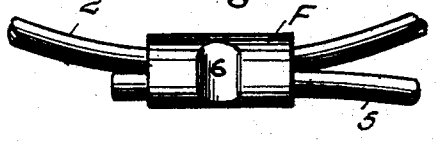


Fig. 9

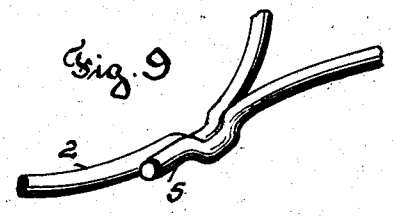


Fig. 8

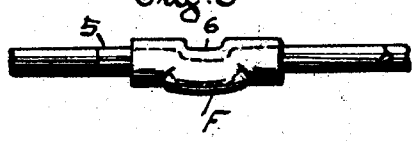
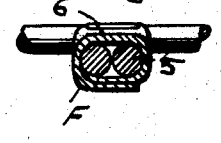


Fig. 7.



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Fig. 10

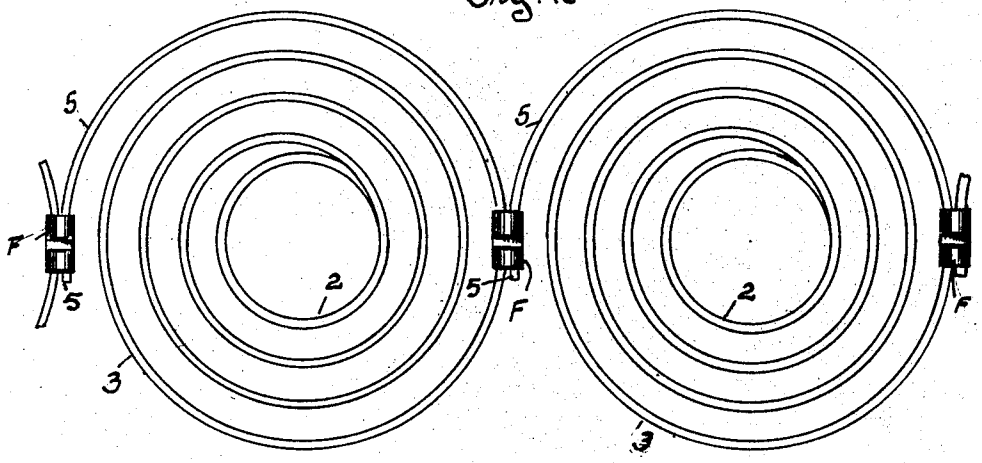
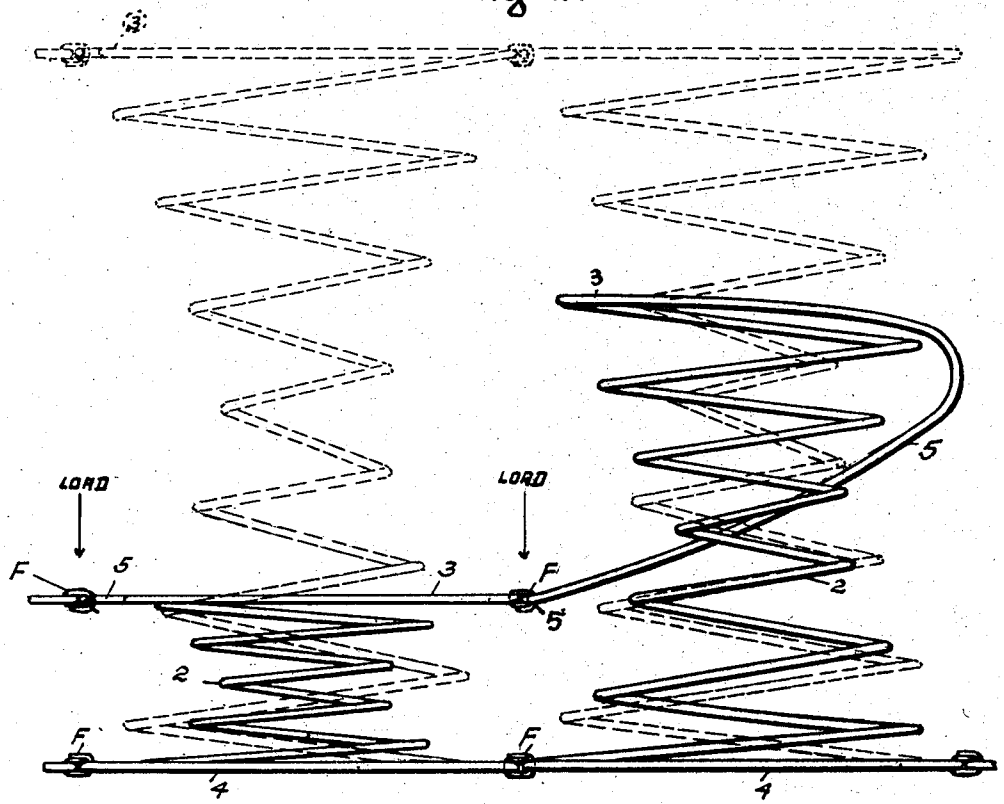


Fig. 11.



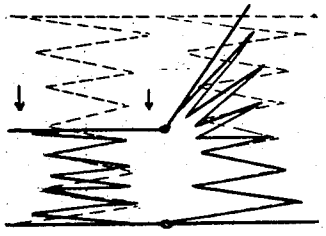


Fig. 12.

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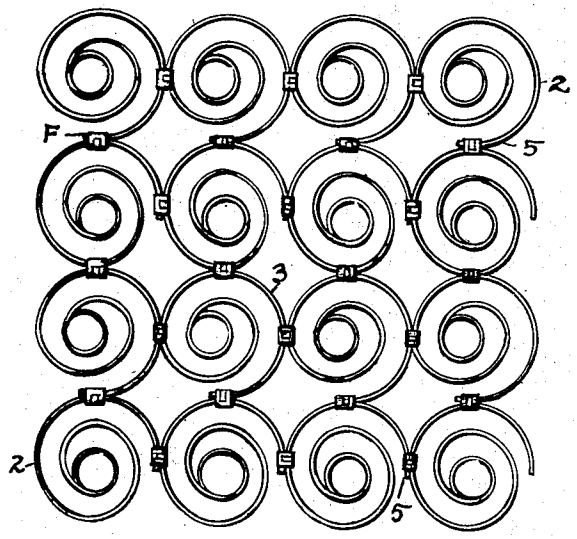


Fig. 13.

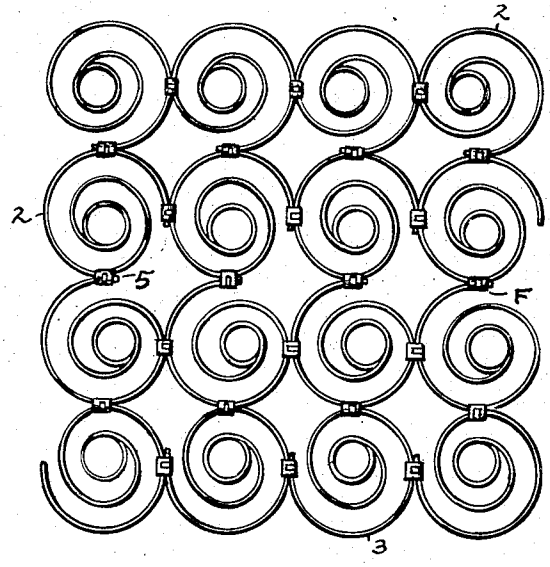


Fig. 14.

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Patented Jan. 13, 1931

1,789,154

UNITED STATES PATENT OFFICE

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SPRING MATTRESS, ETC.

Application filed October 13, 1926. Serial No. 141,293.

My invention relates to spring mattresses, cushions and the like, and in general my object is to provide an exceptionally soft and resilient spring structure in which a plural number of spiral springs are assembled and united in a particular way to permit unity of action and also individual action of the springs in a large measure or degree. As constructed, the spring structure permits each spiral spring, where connected with another, to contract and expand transversely as well as longitudinally so that the complete spring structure may be placed under tension within a pliable or flexible covering or casing, thereby stretching the covering or casing smoothly and uniformly in all directions and in this way maintaining the mattress or cushion at all times in its desired predetermined shape. As connected, the spiral springs are also adapted to promote parallel instead of tilting movements in respect to each other when under load and compressed unequally. These and other objects are attained by using spiral wire springs having open coils or loops, and by connecting the terminal portion of each open coil or loop rigidly to the end coil or loop of one or more adjacent springs, preferably by means of metal clips and by indenting the clips and wires, all substantially as herein shown and described and more particularly pointed out in the claims.

Fig. 1 is a sectional view of a spring mattress or cushion embodying the invention. Fig. 2 is a plan view of a covering or casing of textile material, and Fig. 3 is a plan view of my improved spring structure of comparatively larger dimensions than the casing as it appears before it is introduced into said casing. Fig. 4 is a sectional view of the casing, and Fig. 5 a side elevation of the spring structure, showing the respective dimensions of said parts in a vertical plane and as they appear before being assembled. Fig. 6 is a plan view of the clip for connecting the spring wires rigidly together, and Fig. 7 is a cross-section thereof. Fig. 8 is an edge view of the indented clip and wire, and Fig. 9 a perspective view of the two indented wires without the clip. Fig. 10 is a top view of two coiled springs connected rigidly together according to my invention, and Fig. 11 is a side view of the said two springs in dotted and full lines, showing the parallel action of the springs when one spring is depressed. Fig. 12 is a diagram illustrating the tilting action of two coiled springs united together by a pivotal connection. Fig. 13 is a plan view of a spring structure constructed according to my invention, but comprising a modified arrangement in the setting of the springs in rows, and Fig. 14 is a similar view of a variation in the setting of the springs for rigid connection with each other.

The resilient spring wire structure exemplified in the drawings comprises a plurality of spiral wire springs 2 arranged and connected together in parallel rows. Each spring has convolutions or coils of graduated diameter widely spread apart or extended, thereby providing a resilient body of conical form having a large coil or loop 3 at one end in the case of a single cone and a second large coil or loop 4 in the case of spiral springs of hour glass shape. Heretofore, the general practice has been to form the end coil or loop in a full circle and to twist the end of the wire around the body of the same wire at the beginning of the circle or loop where these parts meet, thus forming an endless closed loop for the spiral spring. I am also aware that other means than twisting the wire has been resorted to in fastening the end of the wire to the body of the spring and to form a closed loop, but the present spiral spring differs from such known springs in that the end coil or loop is left open, that is, the end or terminal portion 5 is not fastened or connected to the body part of the same coil or loop but is free to move or flex in every direction. In employing a spring structure of this kind in a flexible casing or padded covering, such as a cushion cover C, a spiral spring of hour glass shape is preferred and both end loops are left open. However, the end or terminal portion 5 of each end loop is not wholly free in the spring structure as a whole, because each terminal or end 5 is fastened or connected to a body part of the outer loop of an adjacent spring. I use a rigid

connection because I find that a hinge or pivotal connection between the free end 5 of one loop and the body part of the end loop of an adjacent spring affords too much freedom between the springs to function satisfactorily. Thus when two springs are joined with a pivotal connection a side pull on one is caused while the other is being compressed, thus bending and tilting one spring laterally. Under these conditions one spring is distorted and seeks to evade the load while the other spring assumes the main burden. But by fastening the free end of the top loop of one spring in a rigid manner to the top loop of the next spring neither wire can turn and the load is transmitted by the rigid connection from one to the other so that both springs will be compressed on parallel lines even though one spring is compressed more than the other. This distributes the load over wider areas with the resilient benefit from all the springs within that area, without tilting the springs. The parallel movement of two springs under unequal distribution of pressure is illustrated in Fig. 11 by dotted and full lines, which figure shows one spring depressed to a considerable extent and the other spring drawn down in lesser degree, but drawn down nevertheless a substantial distance, by the rigid connection between the top loops. This figure shows the top loop in the depressed spring lying in a horizontal plane and the top loop of the other spring drawn downwardly by the rigid connection until it lies in an inclined plane, making it appear that the wire or wires where united together by fastener F must turn or rotate in order that the parts may stand in that relation. But the wires do not turn where fastened together; instead, a torsional strain or twist takes place in the wire itself throughout the loop and as a result all the coils or loops in that spring are acted upon and pressed downwardly on parallel lines. Obviously, the union between the two wires where the torsional stress centers must be exceptionally strong, otherwise the wires will turn in their seats within fastening device F. I have therefore devised a special form of metal fastener which involves the indenting or upsetting of the two connecting wires and the fastener as delineated in Figs. 6 to 9.

Thus, in fastening the free end or terminal of one open loop of one spring to the wire body or top loop of another spring, the two wires are brought closely together in the same plane and a flat piece or strip of metal is wrapped around both wires until the opposite ends of this piece overlap in substantial degree. Suitable dies are then used to indent the metal fastener transversely thereof, thus also indenting the two wires. A sharply defined depression 6 is formed in the top surface of the fastener which finds its counter part in the two wires, which are kinked or offset downwardly side by side and locked within the bends or offsets which are also formed in the overlapping parts of the fastener. The overlapping ends reenforce each other, and by indenting both overlapping ends the fastener is made strong enough to resist the twisting movements of the wires and also strong enough to prevent the overlapped ends of the fastener from being wedged open under such twisting strains.

Springs such as described may be assembled in several ways, all as exemplified in Figs. 3, 13, and 14. Thus in Fig. 3, I show four parallel rows of springs, each spring in each row having the open side and terminal part of each top loop facing in the same direction. The springs are all rigidly connected together by such indented fasteners as hereinbefore described, because the terminal part of each top loop is free to play in respect to the other coils or loops in the same spring the load-bearing surface of the entire spring structure is not rigid but may be freely compressed in spots or separate places without distorting the open loops of the adjacent springs in any marked degree. The top loop or coil may be stretched laterally or contracted to a smaller diameter and the movement is cumulative where a plural number of sueh springs are rigidly connected together in the way herein described, thus permitting the spring structure to be made of slightly larger dimensions than a covering or casing, say as exemplified in Figs. 2 to 5. Such a spring structure may be flattened to thinner dimensions, as in the ordinary spring assembly, but the present spring structure may also be pressed together laterally and thereby placed under tension so that it will spread transversely when confined within a covering or casing of smaller dimensions than the normal size of said spring structure, thus stretching the goods and maintaining the cushion in its predetermined shape.

In Fig. 13, the same spring and mode of fastening is employed to provide a rectangular spring structure, but the springs in one row have the open sides or terminal portions of their top loops facing in a different direction than the open sides or terminals of the springs in the adjoining row. This arrangement gives equal resiliency from each side of the square or rectangle. A variation of the foregoing arrangement is shown in Fig. 14, where four rows of springs are united together with the springs in each succeeding row turned a quarter in respect to the preceding row.

An extremely important advantage residing in the present invention is that the springs may be made of relatively smaller gauge wire than that used customarily for sustaining the same loads, thereby making a softer and more yieldable spring assembly, but in this connection it must be understood that the

use of such smaller gauge wire would not give satisfactory results unless the springs are united rigidly as herein described so as to utilize the torsibility of the wire in each spring in distributing and carrying the load to other springs. Thus in compressing one spring made of light gauge wire a twisting movement is imparted to the wire in the connected spring which tends to compress the second spring and thereby supplement the resistance of the first spring, see Fig. 11.

What I claim is:

1. A self-contained spring unit comprising a plurality of helically coiled springs, each spring terminating in free flexing extremities, the extremities of each spring being rigidly connected to an adjoining spring, and each spring being formed of continuously curving spiral convolutions from one extremity to the other.

2. A self-contained spring unit comprising a plurality of helically coiled springs, each of the springs terminating in free flexing extremities, and a clip rigidly connecting each of said extremities to an adjoining spring, each spring being formed of continuously curving spiral convolutions from one extremity to the other.

In testimony whereof I affix my signature.

DAVID T. OWEN.