No. 765,258. PATENTED JULY 19, 1904.

O. C. STEINHOFF.

SPRING STRUCTURE.

APPLICATION FILED FEB. 6, 1904.

NO MODEL.

Fig. 1

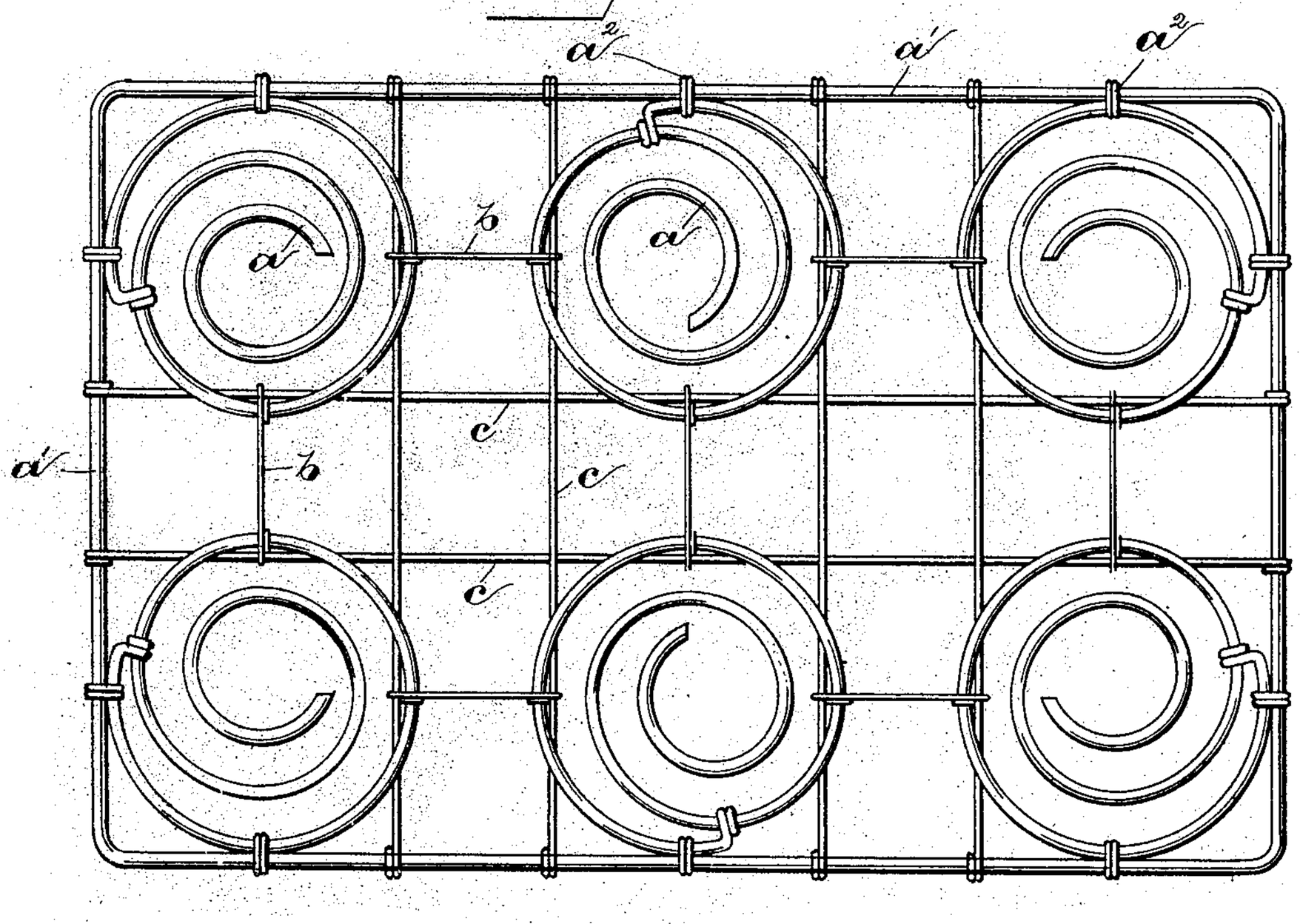


Fig. 2

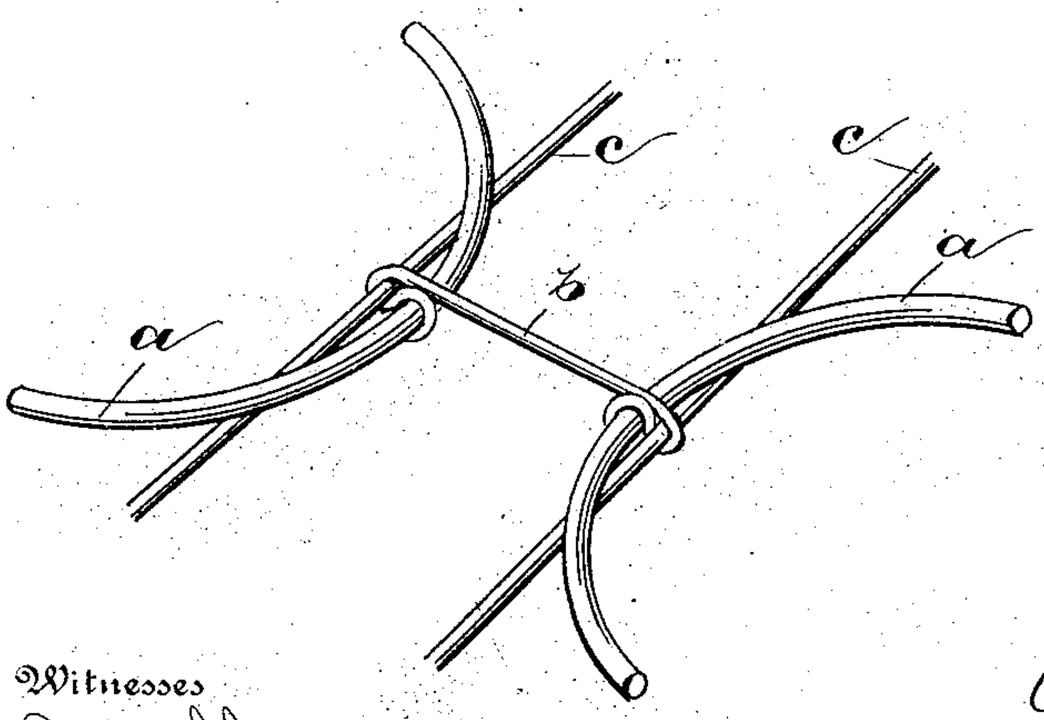
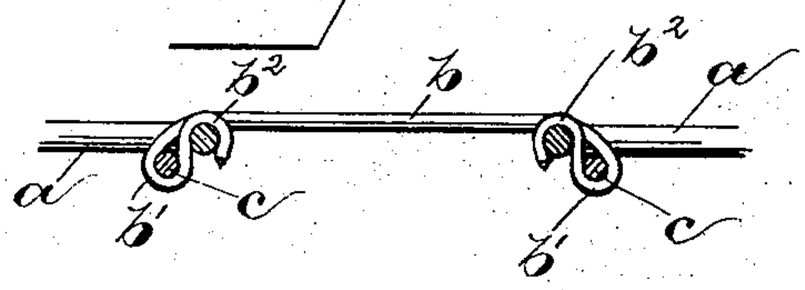


Fig. 3.



Witnesses

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No. 765,258. Patented July 19, 1904.

UNITED STATES PATENT OFFICE.

OTTO C. STEINHOFF, OF COLUMBUS, OHIO, ASSIGNOR OF ONE-HALF TO THE BILLOW-LUPFER COMPANY, OF COLUMBUS, OHIO, A CORPORATION OF OHIO.

SPRING STRUCTURE.

SPECIFICATION forming part of Letters Patent No. 765,258, dated July 19, 1904.

Application filed February 6, 1904. Serial No. 192,330. (No model.)

To all whom it may concern:

Be it known that I, OTTO C. STEINHOFF, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Spring Structures, of which the following is a specification.

My invention relates to spring structures, and especially to the means and method of forming into a strong durable body a plurality of double helical springs; and its object is to greatly simplify the structure as well as the means and mode of construction of such devices, whereby they are not only cheapened and more easily assembled, but also rendered more substantial or less liable to separate under great stress.

A further object is to produce a structure in which the network of wires forming the surface thereof shall be evenly distributed, allowing no comparatively large openings through which the upholstering or other material supported by the structure might sink, and also to provide a structure permitting the use of short lengths of wire of comparatively small gage in uniting the plurality of springs into one body, and thereby reducing the weight of the finished product.

To this end my invention consists of the means, combinations of parts, and mode of construction hereinafter described, and set forth in the claims.

In the drawings, Figure 1 represents a plan view of a reduced structure embodying my invention in which but six helical springs are employed. It will be understood that in practice a great number of such springs are used, as may be necessitated by the required size of the structure. Fig. 2 is a detail in perspective, showing the method of interlacing the various parts. Fig. 3 is a detail of tie-wire.

Like parts are represented by similar letters of reference throughout the several views.

In the said drawings, *a a* represent helical or spiral springs which are spaced equidistant from each other in rectilinear rows, the entire series being surrounded by a rectangular wire frame *a'*. Those spiral springs which are on the outside of the series and adjacent to the said rectangular frame *a'* are attached thereto by a series of wire ties a^2. Each of the spiral springs *a* is further connected to each of its neighboring springs by a tie-wire *b* of the form illustrated in Fig. 3. This tie-wire *b* is formed from a straight piece of wire by twice doubling it back upon itself at either end, this forming at each end an eye *b'* and a hook b^2. After the spiral springs have been properly spaced the tie-wires are placed in position by dropping them over adjacent springs with the respective hooks b^2 engaging adjacent sides of the surface coil of such neighboring spiral springs *a*, the eye *b'* extending beyond said surface coil into the interior of the spring *a*. When the tie-wires *b* are in position, wire strands *c* are passed between opposite and parallel sides of the rectangular frame *a'*. The eyes *b'* of the tie-wires *b* extend beyond the surface coil of the spiral spings *a* and into the path of the wire strands *c*, and said wire strands *c* are successively passed through the eye of each of the respective tie-wires in their path, and the ends of said wire strands are secured by wrapping or other means to the rectangular frame *a'*. Said wire strands *c* pass in both directions—*i. e.*, at right angles to each other—immediately under the surface coil of said spiral springs *a* and in close proximity to the periphery and intersecting each other at points outside the periphery of the surface coils. These wire strands may be of comparatively smaller gage than the wire forming the spiral springs, and the tie-wires *b* may be of smaller gage than said wire strands.

It will be seen that by the tie-wire *b* passing over the surface coils of two neighboring springs, over the corresponding wire strands *c*, thence under said strands and again over and then under said surface coil and the fact that the wire strand *c* passes under the surface coil of the spiral spring at points on either side of the point at which it passes over the tie-wire *b*, (all of which is illustrated in Fig. 2,) the parts are so woven and interlaced as to form a strong durable struc-

ture, simple and cheap in construction and especially easy to assemble, in which tie-wires and strands of comparatively small gage may be employed, thereby materially reducing the weight of said structure. It will be also noticed that the surface wires are very evenly distributed and that the openings between said surface wires are of comparatively small size, which is a valuable feature in structures of this class.

By employing the tie-wires with the eyes at their ends and the downwardly-opening hooks intermediate of the ends it will be seen that the hooks engage the surface wires of the spring-coils and remain in their positions by gravity until the transverse strands are passed through, when they are locked firmly in their positions without the necessity of clenching, leaving a perfectly-smooth upper surface.

Having thus described my invention, I claim—

1. In a structure as described, a rectangular frame, helical springs arranged therein, tie-wires engaging neighboring springs and extended over the surface coil of said springs and within the circle of the same, said tie-wires being bent to form eyes in their extremities which extend below said surface spring-coils, and wire strands extending between opposite sides of the rectangular frame immediately under the surface spring-coils and through eyes formed in said tie-wires, substantially as specified.

2. The combination of spiral springs, tie-wires connecting neighboring springs, transverse strands passing under the surface coils of said springs at right angles to each other and engaging said tie-wires and surface coils to lock the same together, said transverse strands intersecting each other at points outside of the periphery of said surface coils, substantially as specified.

3. In a structure as described, a rectangular frame, helical springs arranged therein, tie-wires extending between neighboring springs, and terminating with an eye at either end, hooks intermediate of said eyes engaging the surface coils of said springs, and wire strands passing under the surface coils of said springs and engaging the eyes of said tie-wires, substantially as specified.

4. The combination of spiral springs, tie-wires traversing the shortest distance between neighboring springs and engaging therewith, transverse strands passing under the surface coils of said springs and intersecting each other at points outside the periphery of said surface coils, said strands engaging said tie-wires by projecting through loops in the extremities thereof, substantially as specified.

5. In a structure as described, a rectangular frame, helical springs arranged therein, and tie-wires provided at each end with a loop and with a downwardly-extending hook, said hooks being adapted to fit over the surface wire of adjacent springs and wire strands extending across the rectangular frame in either direction and projecting through the loops of said tie-wire to hold the same in position on said springs, substantially as specified.

In testimony whereof I have hereunto set my hand this 3d day of February, A. D. 1904.

OTTO C. STEINHOFF.

Witnesses:
N. K. BILLOW,
GEO. B. LUPFER.