(No Model.)

2 Sheets—Sheet 1.

J. G. SMITH.

SPIRAL SPRING.

No. 544,597. Patented Aug. 13, 1895.

Fig. 1.

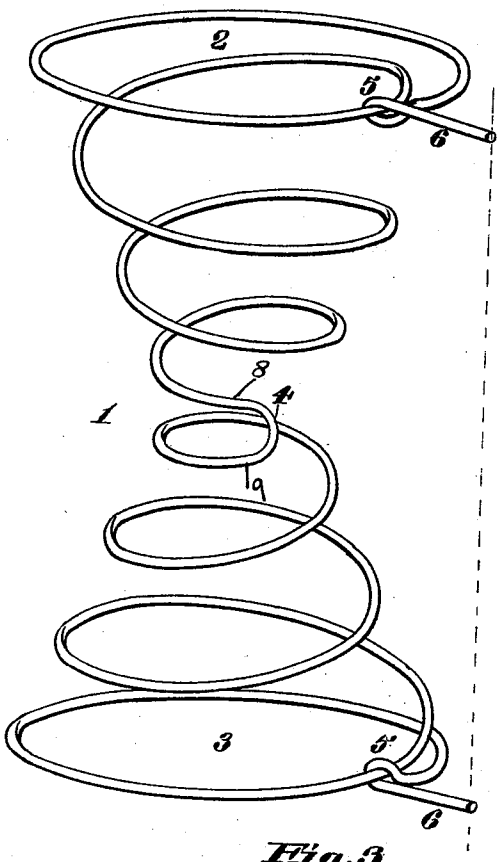

Fig. 2.

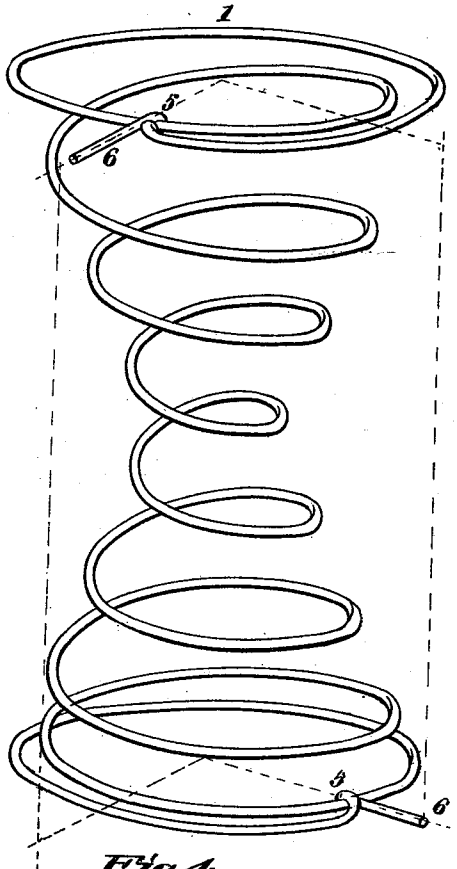

Fig. 3.

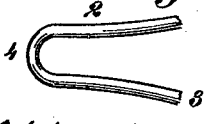

Fig. 4.

Attest;
Charles Pickles.
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John G. Smith

(No Model.)

2 Sheets—Sheet 2.

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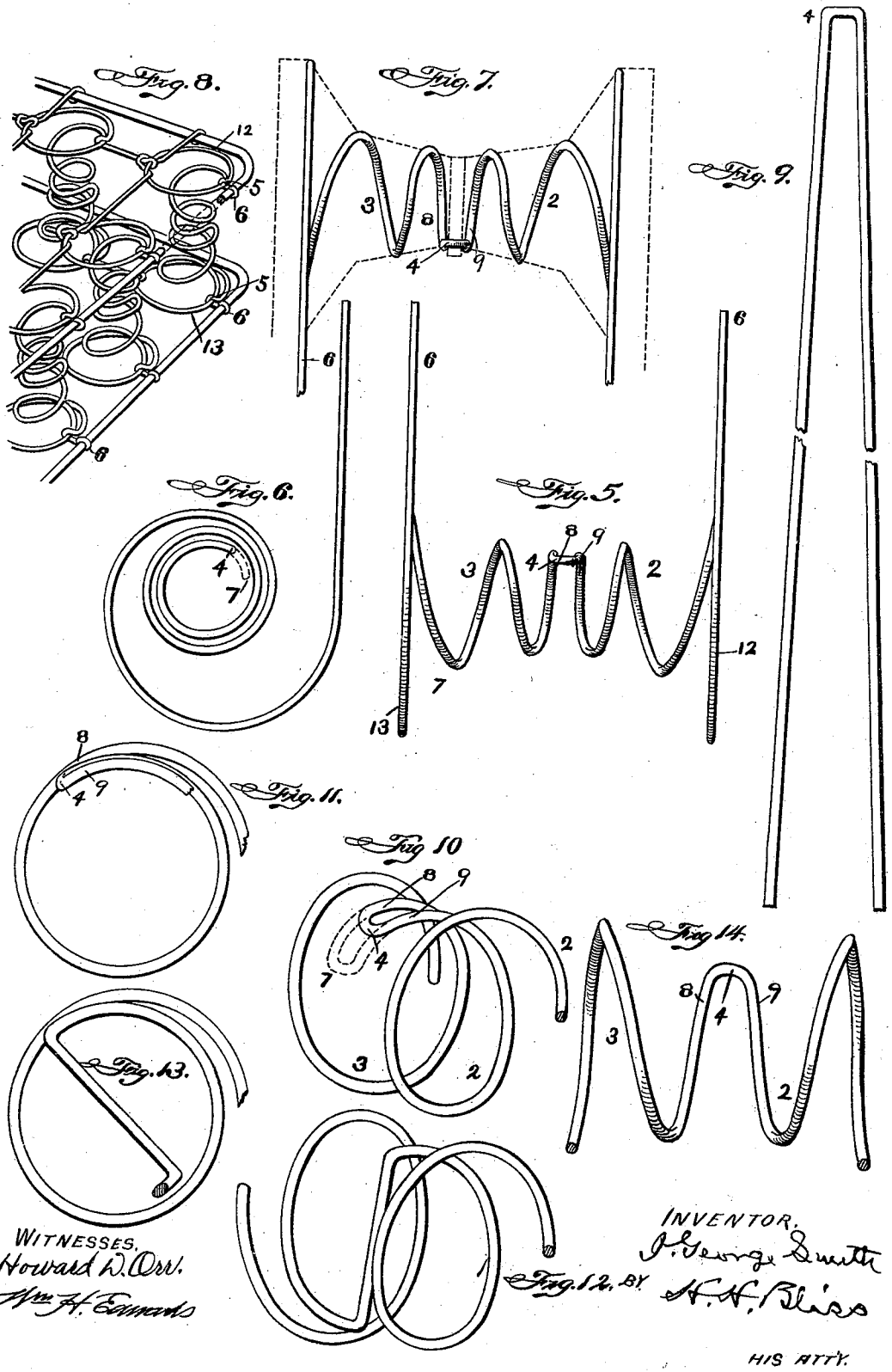

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BY H. H. Bliss
HIS ATT'Y.

UNITED STATES PATENT OFFICE.

JOHN G. SMITH, OF ST. LOUIS, MISSOURI.

SPIRAL SPRING.

SPECIFICATION forming part of Letters Patent No. 544,597, dated August 13, 1895.

Application filed September 19, 1891. Serial No. 406,193. (No model.)

To all whom it may concern:

Be it known that I, JOHN G. SMITH, a citizen of the United States, residing at St. Louis, State of Missouri, have invented certain new and useful Improvements in Spiral Springs; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The object of this invention is to overcome the difficulties arising from the coil or recoil in a double helical or hour-glass-shaped wire spring. The explanation of these difficulties is, first, that the frequent pressure in the use of the furniture-spring above described, when wound continuously in one direction from one end to the other, causes it to gradually recoil, thus causing it to become unbalanced and to tip over or otherwise settle and lose its shape and usefulness. Second. Another great difficulty in the continuously-wound-in-one-direction spring, when made of a quality of wire that will receive temper, is that in passing through said process the wire will coil or the ends will travel forward in the direction they are pointing or wound. This coil or recoil in continuously-wound springs is especially objectionable when the outer ends of the springs are finished with an extended arm for the purpose of joining them in a bank of springs or spring-bed, having the effect to make the opposite surfaces warp or stand awry to each other and causing the springs individually to tip over.

Having specified the object of my invention and explained the difficulties I have overcome, I will now describe my invention, which consists of a spring with a loop or return-bend or eye, preferably at or near the middle of said spring. Said loop is attached to the center of the cones on which the projecting ends of the wire from the loop are wound in opposite directions spirally from the point of contact on the cones or mandrel. It will thus be seen that the ends of the wire on the cones when the spring is wound will both point in the same direction, the ends of the spring being duplicates with returning spirals must coil, recoil, expand, or contract uniformly always in the same direction and leaving the relative portions of the spring in the same position one to the other, presenting the ends running in the same circular direction, after which the ends may be secured to the last coil at each end, if so desired. Thus it will be seen that the coils each side of the loop or bend will be of the same diameter and the same length, causing the terminals of the wire forming the spring to be in the same relative position to the last coil at each end, and also that the ends will be opposite each other at opposite ends and both on the same side of the spring.

In the accompanying drawings, Figure 1 is a perspective view of my spring, showing the ends secured to the last coil and the relative position of the arms at each end, as indicated by the dotted line. Fig. 2 is a perspective view of a spring coiled in one direction throughout its length and showing the relative position of its arms, as indicated by dotted lines; Fig. 3, a detail elevation view of bend; Fig. 4, a detail elevation view of loop. Fig. 5 is a side view of the spring, showing it immediately after the coiling operation. Fig. 6 is an end view of the spring in Fig. 5. Fig. 7 is a side view of the spring, looked at from the side opposite to the side shown in Fig. 5, the dotted lines indicating its relations to the former. Fig. 8 shows a bed-bottom similar to that in my earlier patent, No. 269,242, with the single exception of the centrally-looped spring forming the subject-matter of this case. Fig. 9 shows the spring with its strands or legs straight. Fig. 10 is a perspective of the central part of the spring. Fig. 11 is a side view of the same. Fig. 12 is a perspective, and Fig. 13 a sectional, view of a spring heretofore known, Figs. 10 and 11 showing by comparison the peculiar features of my spring. Fig. 14 is a side view of the part shown in Fig. 10.

Fig. 1 is a spring consisting of the section 2, coiled to the left, and the section 3, coiled to the right, or, more distinctly, the section 2 a left-hand screw and section 3 a right-hand screw.

4 is a loop or bend shown midway between the two sections 2 3, and being the point at which the wires diverge from each other.

Bed-springs have been heretofore made or proposed having a left-hand twist at one end and a right-hand twist at the other, these two

end portions being joined by a bar or a piece of the spring-wire which extends transversely through the longitudinal axis of the whole spring, as shown in Figs. 12 and 13. This earlier spring referred to required the manipulating of a long wire, the grasping it at the center by passing it longitudinally through an aperture in or gripping it in the "former," then starting the twist of one end on one side of the axis, and starting a twist for the other end on the other side of the axis. After said springs are produced by this tedious and difficult operation they cannot be tempered without the coil being forced out of the desired position by the expansion of the metal under the high heat used in tempering.

By examination of the spring which I have devised it will be seen that no part of it crosses the longitudinal axis, the looped part lying entirely at one side or periphery of the spring and on the periphery of the former, (see Fig. 7,) both of the strands of wire at 8 and 9 by the sides of the loop 4 turning backward from the loop on circular or spiral paths, one starting the left-hand twist and the other the right-hand twist. Several important results proceed from these facts. Wire of but one-half the total length requires manipulation when the spring is thus made with the bend, because, as will be seen by examining Fig. 9, the length of the wire is, so far as concerns handling it during the coiling operation, reduced to one-half. Consequently the wires can be handled more rapidly and a greater number of springs produced by an operator in a given time; but possibly the most important result is the completely successful tempering which I attain.

By referring to my said earlier patent, No. 269,242, of December 19, 1882, and numerous others illustrations will be found of the well-known fact that spring mattresses or bed-bottoms have for a long time commonly been made with steel wire throughout. The springs proper are made of steel wire of a relatively small gage, and after being joined together in a bank they are secured to marginal steel wires at top and bottom of a relatively larger gage. Now the bending of the wire at the very numerous points necessary to produce such an article results in a serious attack upon the resiliency and temper of the steel, and it has been felt to be very desirable to devise some way to provide for the retempering of the steel after the mattress has been completed. It is also desirable to japan many of these articles, which requires, also, the application of a high heat; but it has been found that the retempering of mattresses containing springs of the earlier sorts is practically impossible, or at least that it can be done only with a result of throwing the parts out of their desired relations. As soon as the several wires forming the springs, respectively, begin to experience a high heat they expand longitudinally, and there being in the average spring upward of four feet of wire the expansion amounts to so much that with the total number of springs it amounts to several inches. When the springs are coiled in one direction continuously from bottom to top, this longitudinal expansion of the wire causes the coils to "creep"—that is, bulges or forces them away from the longitudinal axis and displaces the points at which they are attached to the top and bottom frames. When the springs are made in my improved way with the peripheral loop, the difficulties arising from this longitudinal extension during heating and contraction subsequently are overcome. By referring to Figs. 6 and 10 these facts will be found illustrated. The heated wire expands toward the center or narrowest part at the loop 4. This loop merely tends to travel or creep without interference a short distance around the axis, as shown by the dotted lines at 7 in said figures. Hence twisting and torsion at the top and bottom are prevented and there is no strain upon the upper or lower connecting-frames illustrated in Fig. 8. In this respect my spring is easily distinguished from those wherein a continuous twist was used from top to bottom, and also from those in which a central bar was carried across the axis and opposite coils were carried therefrom to the ends, as illustrated in Figs. 12 and 13. In either case there are the same effects felt at the ends of the spring under the heating.

5 are loops in the end of the wires, and 6 arms for the purpose of securing the springs in a bank or nested position. These loops and arms are passed around and secured to the top coil 12 and the bottom coil 13 of each spring. The loops 5 at the top and the bottom lie in the same axial planes, substantially, and therefore there is practically exactly one-half of the wire between each loop 5 and the central loop 4, so that the spring is perfectly balanced, not only with respect to its action when in use, but with respect to the aforesaid longitudinal extension when heated.

I do not herein claim the subject-matter incident to having two or more of the springs illustrated and described secured together to form a mattress or bed-bottom, having shown and described the same in another application, Serial No. 526,729, filed October 23, 1894; nor do I herein present any claims for the method of manufacturing a coiled bed-spring such as illustrated and described, preferring to claim the novel features incident thereto in my application, Serial No. 550,963, filed May 28, 1895, as a division hereof, and restricting myself in the present case to claims for the novel features incident to the spring as an article.

Having thus described my improvement, what I claim, and desire to secure by Letters Patent, is—

1. A coiled bed spring having at its center, longitudinally, a loop 4 from which the strands 8 and 9 immediately extend peripherally in the same direction, and longitudinally in opposite directions to form a right hand spiral

between the center and one end and a left hand spiral between the center and the other end, said spring being open at and through its center, longitudinally, whereby it is balanced and permits heating without disturbing the ends, substantially as set forth.

2. A bed spring having its end portions coiled in opposite directions, the middle part of the spring having a loop or return bend, 4, connecting the inner ends of the oppositely coiled parts of the spring, and situated entirely at one side of the center of the spring, substantially as set forth.

3. A bed spring formed of continuous wire having reversely coiled portions at its outer ends, the ends, 8 and 9, of the said coiled portions nearest the middle of the spring being approximately parallel to each other and connected directly by a part, 4, whereby the wire may expand longitudinally without distorting the spring, substantially as set forth.

4. A coiled bed spring having the loop 4 at the center, longitudinally, and two spiral strands coiled in opposite directions extending from said loop in opposite directions toward the ends, and having the ends of the wire looped in or engaged with the end coils at points in substantially the same plane through the longitudinal axis of the spring, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN G. SMITH.

Witnesses:

CHARLES PICKLES,

ART. D. GREENE.