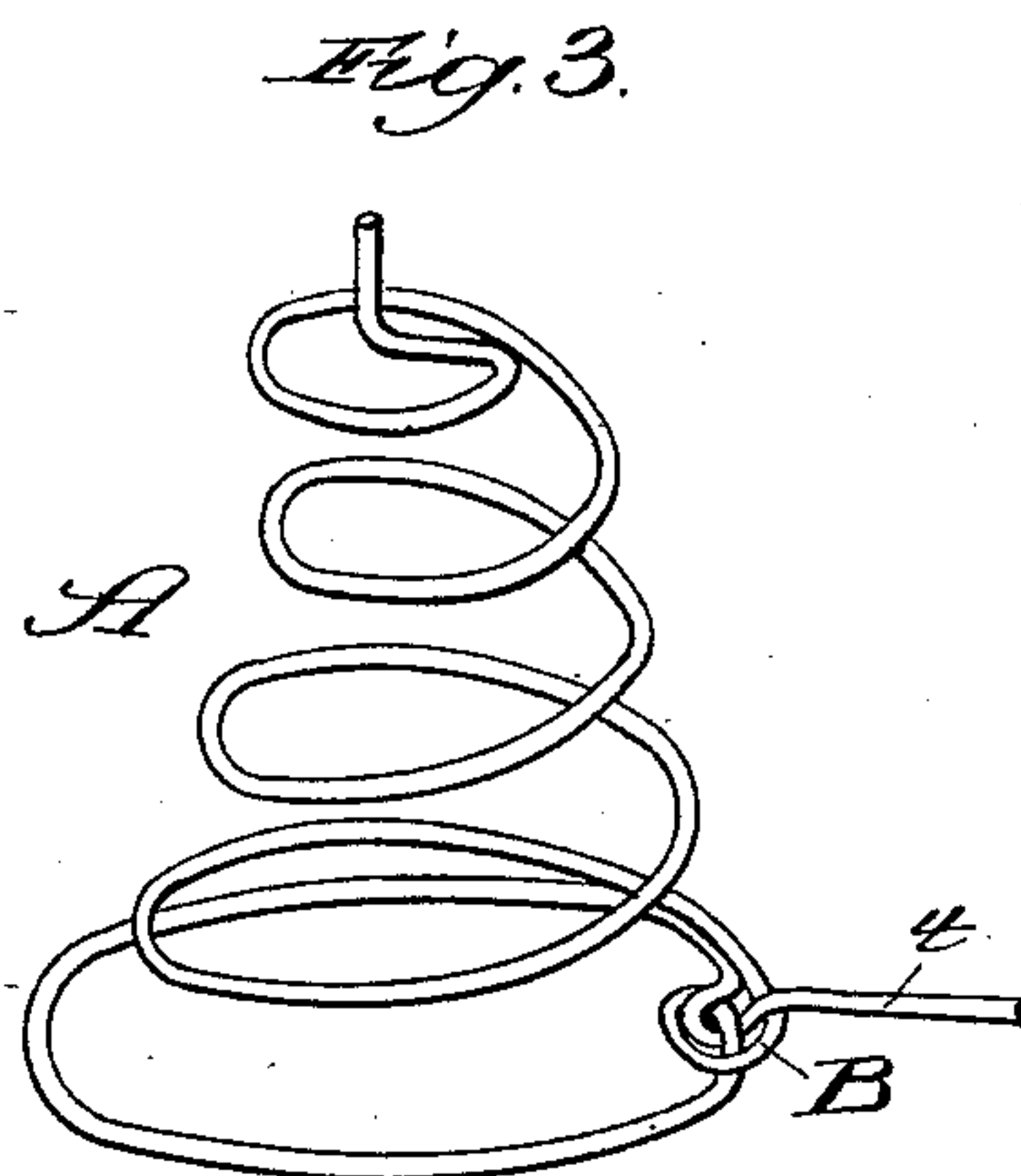
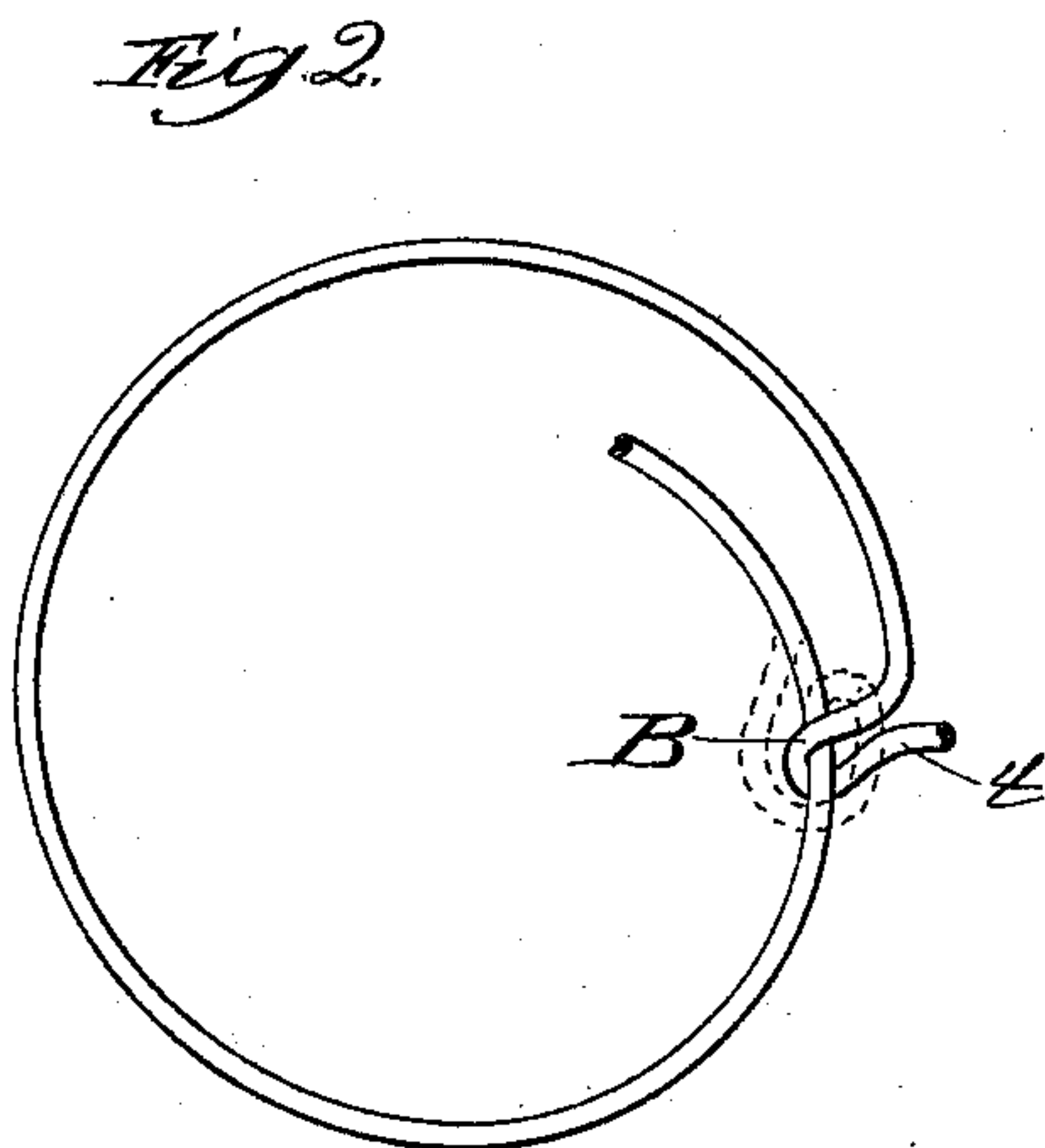
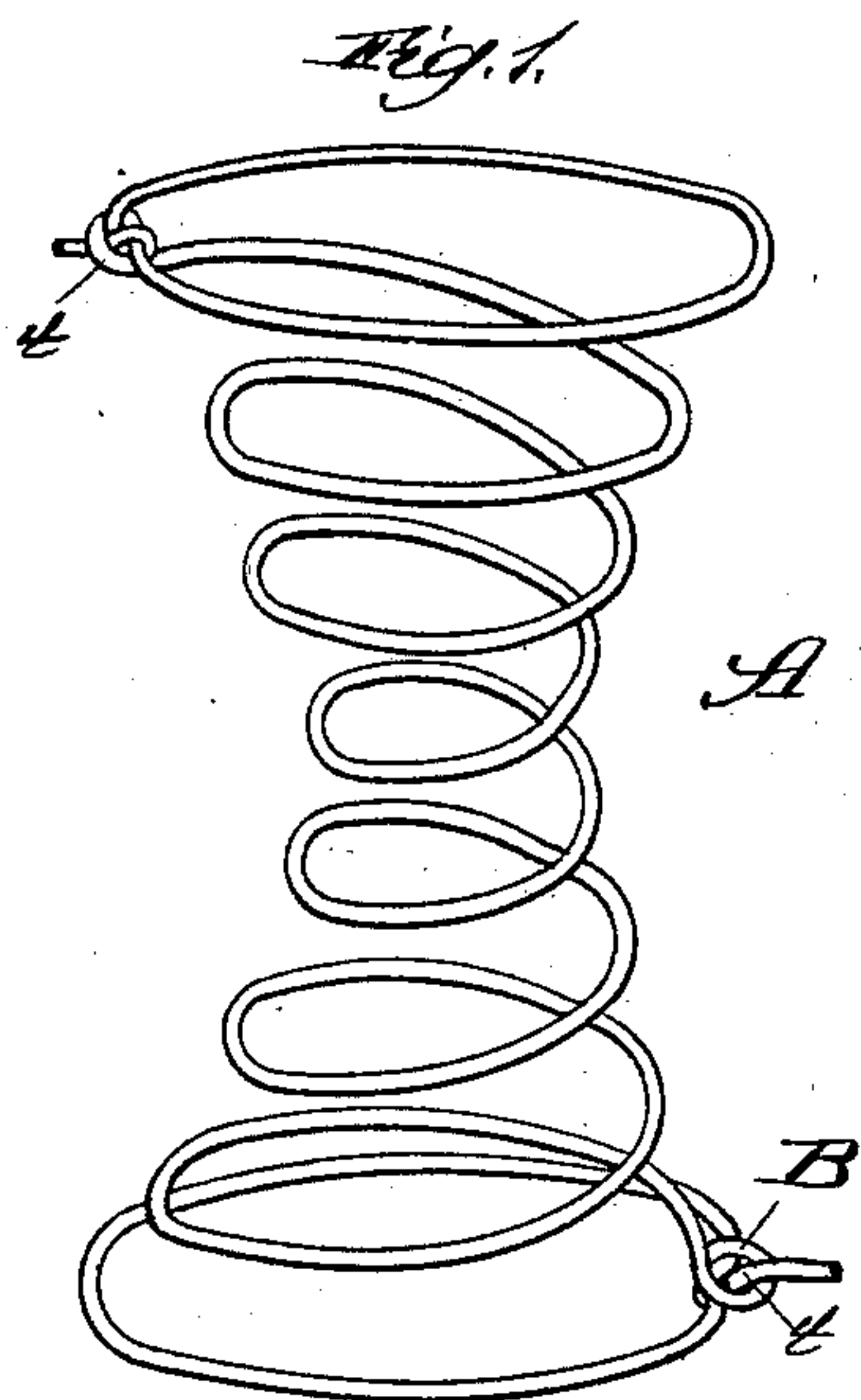


(No Model.)

J. H. SULLIVAN.
SPRING.

No. 452,088.

Patented May 12, 1891.



Witnesses:
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UNITED STATES PATENT OFFICE.

JOSEPH H. SULLIVAN, OF CHICAGO, ILLINOIS.

SPRING.

SPECIFICATION forming part of Letters Patent No. 452,088, dated May 12, 1891.

Application filed June 10, 1890. Serial No. 354,890. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH H. SULLIVAN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Springs, of which the following is a specification.

My invention relates to improvements in wire springs, and more particularly to the class of springs extensively used in the construction of spring beds, mattresses, &c., made in the form of a single or double helix and resilient against compression in the line of its axis.

In the construction of these springs it is necessary to fasten one or both ends of the wire upon the adjacent end convolutions, and various means of fastening have hitherto been employed, all of which are more or less objectionable, either because they permit the fastened end to slip along the end convolution or to become disengaged therefrom when the spring is compressed, or because they afford a pivotal connection between the joined parts, which in the use of the spring is liable to cause them to turn to a limited extent one upon the other and produce a squeaking noise.

My object is to overcome the objections to the means of fastening hitherto employed by securing the end of the wire upon the adjacent end convolution of the spring by means of a knot of peculiar formation, which may be easily and quickly made, and which will hold the end against slipping or becoming disengaged and the end and end convolution against turning upon each other in the ordinary use of the spring.

In the drawings, Figure 1 is a view in perspective of a double helical spring having both of its ends fastened in accordance with my invention; Fig. 2, a broken perspective view of an end of the same, illustrating by full lines the first step in the production of the knot and by dotted lines the second and final step; and Fig. 3, a single helical spring

having its end fastened by a modified form of the knot.

The spring A is formed upon a coiling-mandrel in the usual manner, which leaves the ends of the wire free. Each knot B is formed by bending the respective end portion *t* of the wire around the first or end convolution of the spring to form the loop (shown in Fig. 2 by full lines) and then turning the body portion of the spring, or all except the end convolution, around a complete revolution to bend the part of the spring just beyond that engaged by the end *t*, and which connects the end convolution with the respectively adjacent convolution around the said end to form a loop about the outside of the latter. The body portion of the spring may be turned to the right, as shown in Fig. 1 and indicated by dotted lines in Fig. 2, or it may be turned to the left to make a loop like that shown in Fig. 3. The knot B thus affords a rigid connection between the end portion of the wire and the end convolution, to which it is attached, and obviates all danger of their becoming disconnected or sliding or turning one upon the other.

When it is desired to connect several of the springs in series, the end portions *t* may be left sufficiently long for the purpose, as indicated in Fig. 3.

What I claim as new, and desire to secure by Letters Patent, is—

A wire spring A, having the end portion of the wire and the end convolution secured together by a rigid knot B, comprising a loop formed by bending the end *t* about the wire, forming the end convolution, and a loop formed by bending the wire where it connects the end convolution with the adjacent convolution about the outside of the loop formed by the end *t*, substantially as described.

JOSEPH H. SULLIVAN.

In presence of—

J. W. DYRENFORTH,
M. J. FROST.