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 APPARATUS FOR ROLLING SPIRAL OR HELICOIDAL SPRINGS.  
 APPLICATION FILED MAR. 7, 1906.

907,594.

Patented Dec. 22, 1908.

Fig. 1

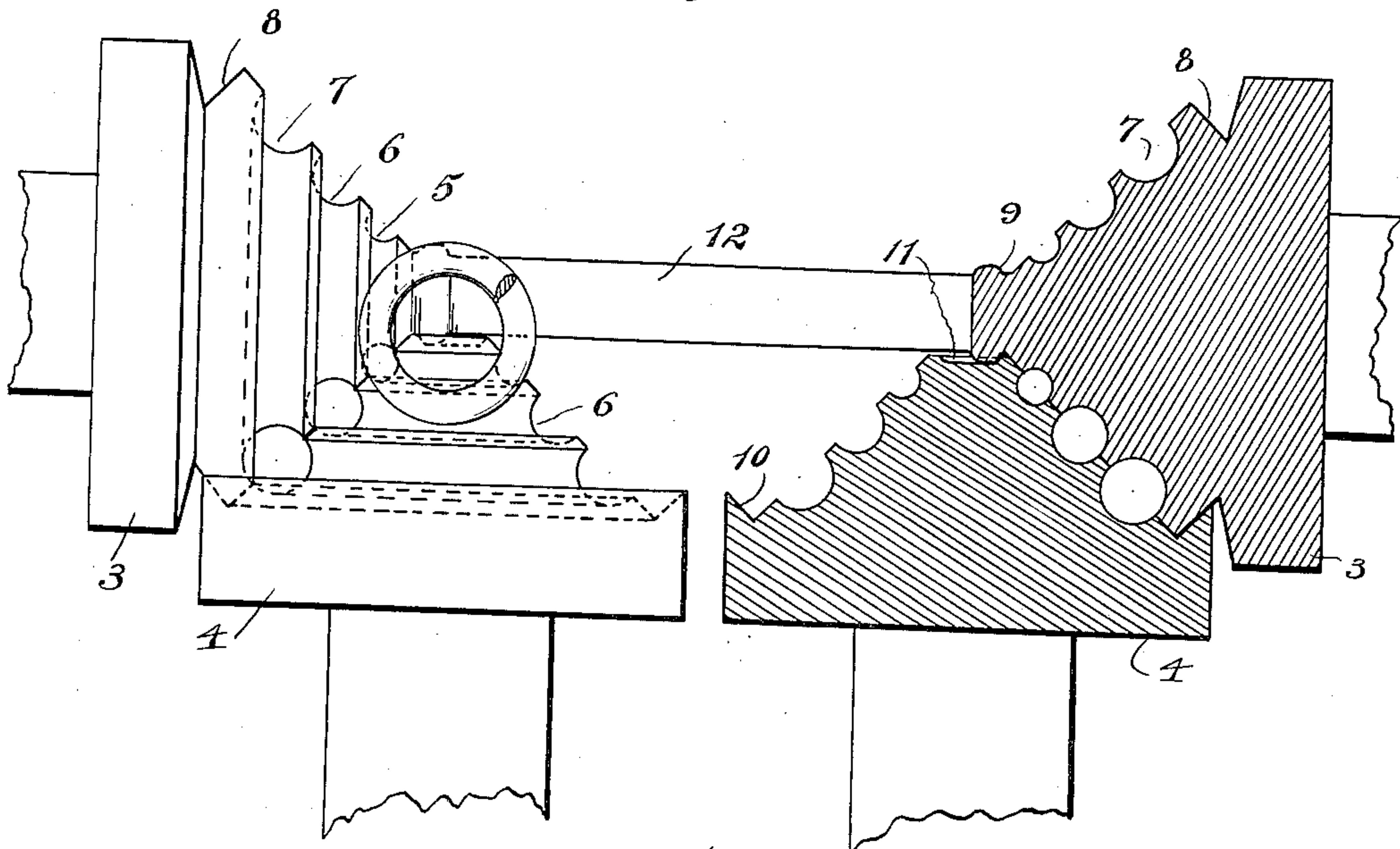
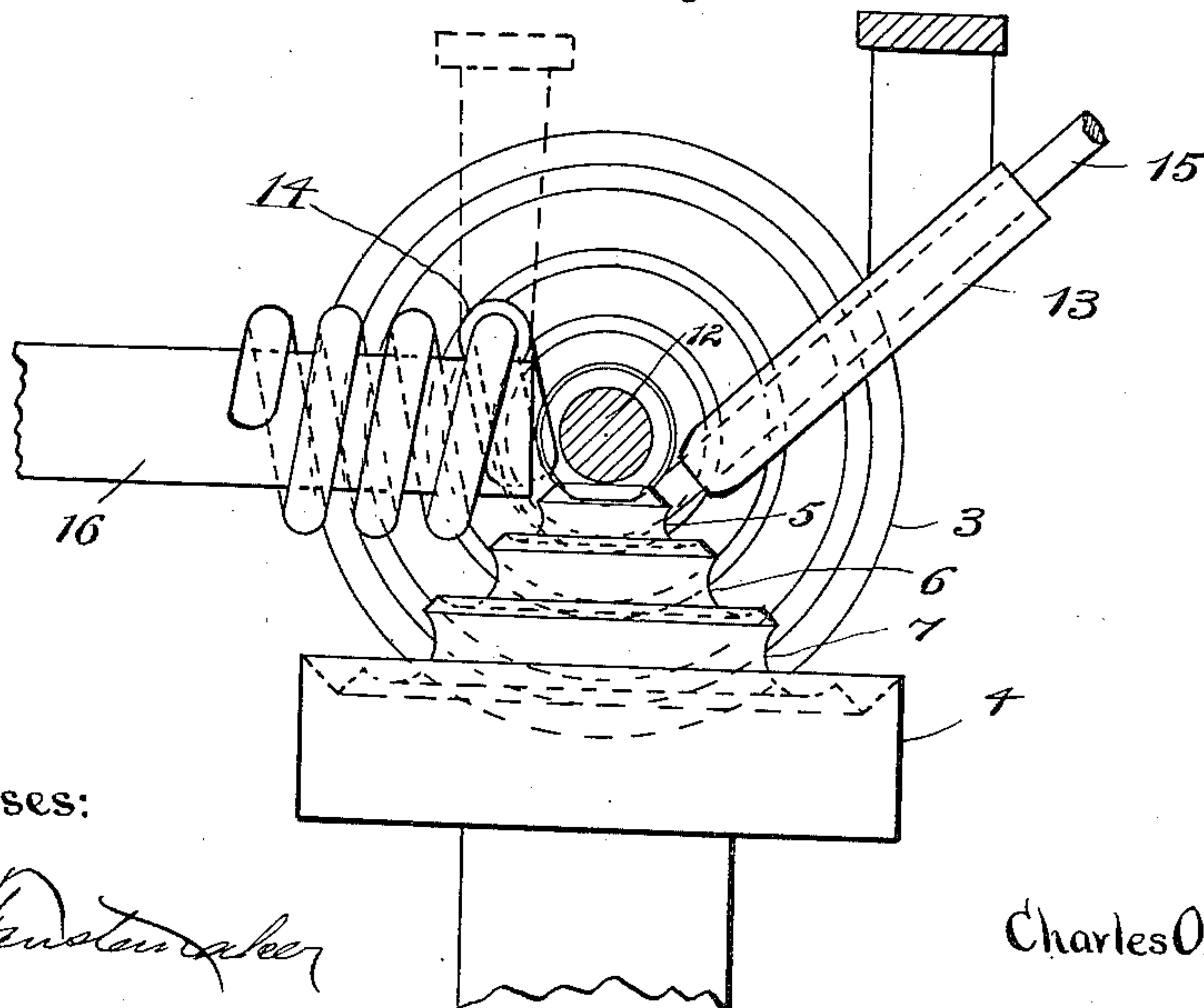


Fig. 2



Witnesses:

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Inventor,

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Att'y.



# UNITED STATES PATENT OFFICE.

CHARLES OSCAR GUSTAVSEN, OF COLUMBUS, OHIO.

## APPARATUS FOR ROLLING SPIRAL OR HELICOIDAL SPRINGS.

No. 907,594.

Specification of Letters Patent.

Patented Dec. 22, 1908.

Application filed March 7, 1906. Serial No. 304,709.

*To all whom it may concern:*

Be it known that I, CHARLES OSCAR GUSTAVSEN, 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 an Apparatus for Rolling Spiral or Helicoidal Springs, of which the following is a specification.

Heretofore it has been customary to make spiral springs by twisting the stock around a suitable mandrel, to make the spring of such form as desired. While it is possible to form springs in this manner, yet the operation tends to break down and weaken the stock rather than to strengthen the same. By means of my improved apparatus and method, which will be fully described hereinafter, the stock is rolled into the desired helicoidal form, preferably while hot, thereby tending to strengthen the material by working it lengthwise of the grain and consequently forming better springs.

In the drawings accompanying this application; Figure 1 is a side-view of the mechanism used to form the spring, one set of cones of the forming rolls being shown in cross-section, and the driving means being omitted, and, Fig. 2 is a cross-sectional view, showing one pair of the forming rolls with the spring being formed thereon.

According to this invention, the helicoidal spring, of any desired cross-section, is to be formed from the stock by rolling the latter through suitable rolls, which will give it the desired turns to make the spring. I prefer to use substantially conical, coacting rolls 3 and 4, as shown in the drawings; and for springs of round cross-section, these rolls are provided with one or more semi-circular grooves 5, 6, and 7, the grooves of the two rolls coming together on the tangential line between the two rolls, as shown in Fig. 1. The object of having a plurality of grooves, is to enable different sized springs, or springs having a larger central opening, to be formed on the same pair of rolls. I also prefer to interlock the conical rolls by forming shoulders 8 and 9 in one of said rolls, which enter grooves 10 and 11 in the other roll. These interlocking collars will prevent the rolls from creeping or sliding out of alignment. The pair of rolls are preferably driven so that they have the same peripheral speed. This may be done in any desired manner, and the rolls may also be mounted in any suitable frame, such frame and driving

means forming no part of the present invention.

For convenience in construction and to add to the strength and rigidity of the apparatus, I prefer to connect two horizontal rolls by means of a shaft 12, said shaft, rolls, and the trunnions for said rolls, all being formed of one suitable piece of material. By having a second vertical roll to coact with the second horizontal roll, enables me to make right and left hand springs on the same machine. In order to guide the stock which is fed to the rolls, I prefer a guide 13, which may be supported in any suitable manner from the frame. I also provide a second, or discharge guide 14, preferably of substantially the same form as the spring to be made. This discharge guide may also be supported in any desired manner from the frame.

In operation, the rolls being given the proper turning movement, the stock 15 is fed through the guide 13 into one of the grooves, as 5, and in passing through said groove between the rolls, is given the proper twist or form to make the desired helicoid. As the stock comes through the groove, it engages with the discharge guide 14 and is preferably directed onto a supporting rod or pipe 16, as shown in Fig. 2. It will be noted that, on account of the pitch or arrangement of the cones, the speed of the outer portion of the pass formed between the rolls is greater than the speed of the inner portion, and, as the stock which is fed into the pass is of slightly greater diameter than the pass, this faster movement will cause the stock to be drawn out or elongated on one side, and it is this elongation which forms the stock into the desired helicoid or spiral. This rolling or forming tendency while passing between the forming rolls, not only gives the stock the proper shape, but also strengthens the same by working it lengthwise of the grain and compressing the material in the pass between said rolls.

It is obvious that various changes may be made in the details of construction and in the form of the rolls without parting from the spirit of this invention, and I do not wish to limit myself to the exact construction herein shown, which is intended more as a diagrammatical illustration than as a working drawing, but

What I claim and desire to secure by Letters Patent is:

1. In an apparatus for rolling spiral or heli-



coidal springs, the combination of two conical rolls having grooves therein to form a pass of slightly less cross-section than the stock to be acted upon, said rolls being arranged with their axes at a sufficiently large angle to each other so that the speed of the outer portion of the pass will be substantially greater than the speed of the inner portion, whereby the stock, as it is drawn through the pass, will be upset and rolled into a spiral or helicoidal form.

2. In an apparatus for rolling spiral or helicoidal springs, the combination of two conical rolls having their axes arranged at approximately  $90^\circ$  to each other, a pass formed between said rolls for receiving the stock to

be formed into a helicoid, said pass being of slightly less cross-section than the stock, the arrangement being such that the speed of the outer portion of the pass will be substantially greater than the speed of the inner portion, whereby the inner side of the stock, as it is forced through the pass, will be at the inner part of the helicoid, while the outer and faster moving portion of the stock will form the outer part of the helicoid.

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Witnesses:

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