Mar. 6, 1923.

1,447,299

E. C. FREEMAN

SPRING WINDING DEVICE

Filed May 10, 1921

5 sheets-sheet 1

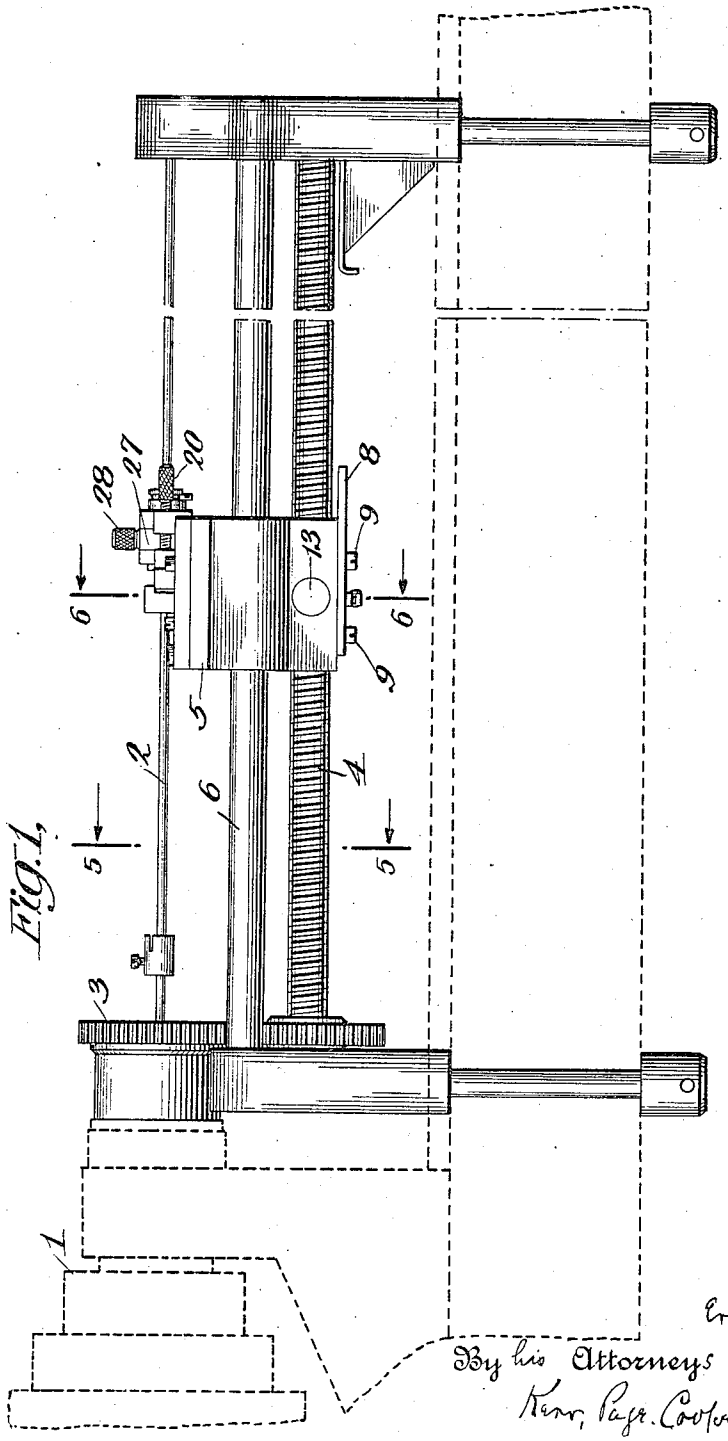

Fig. 1.

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5 sheets-sheet 2

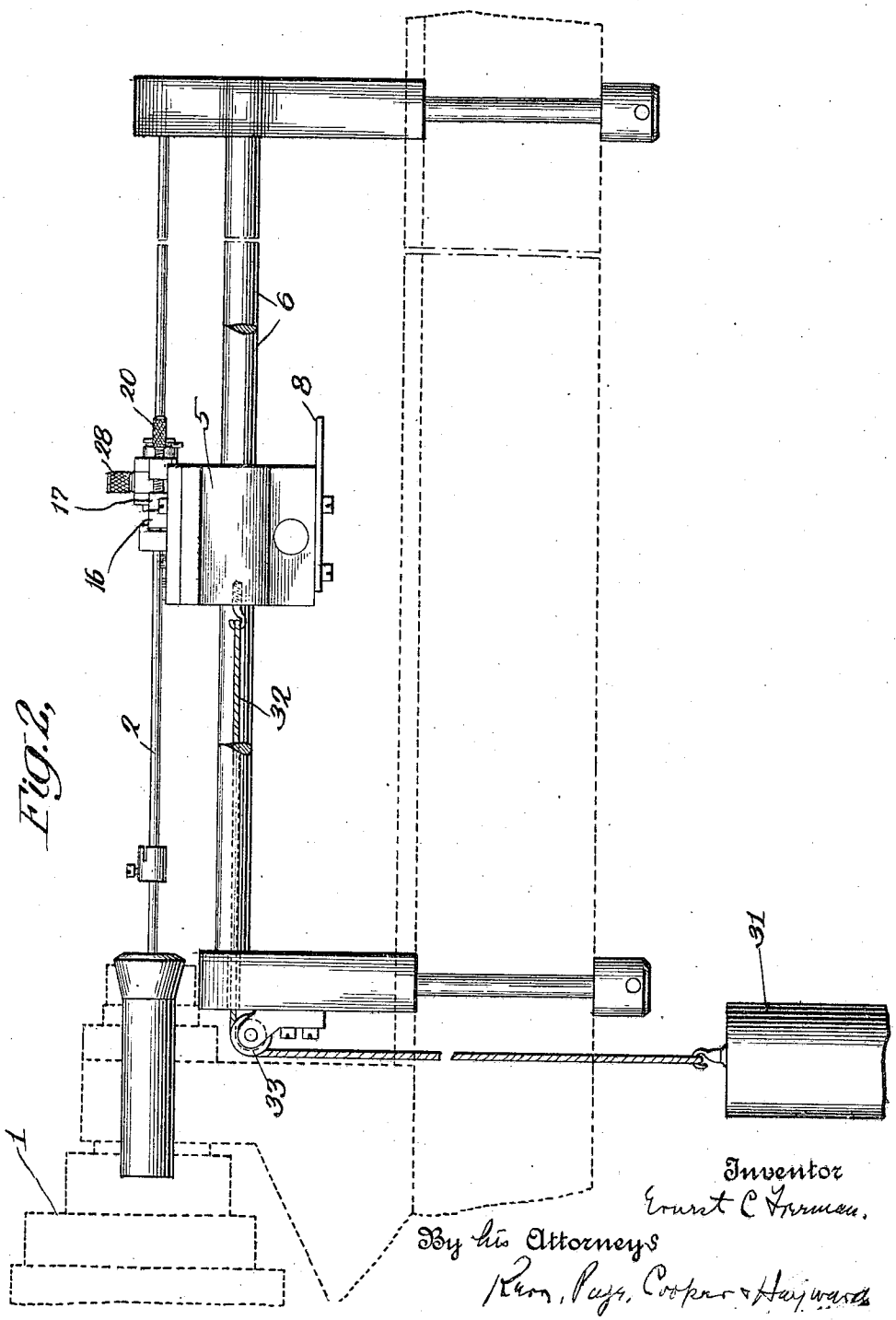

Fig. 2.

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5 sheets-sheet 3

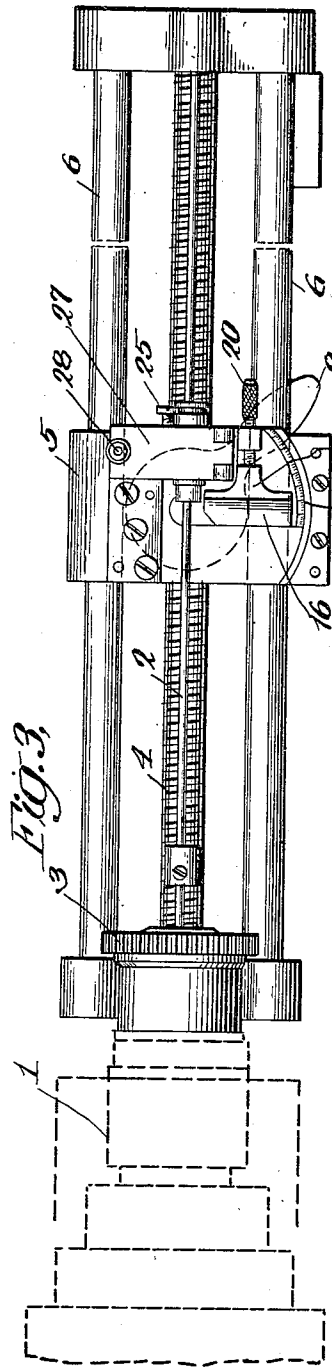

Fig. 3.

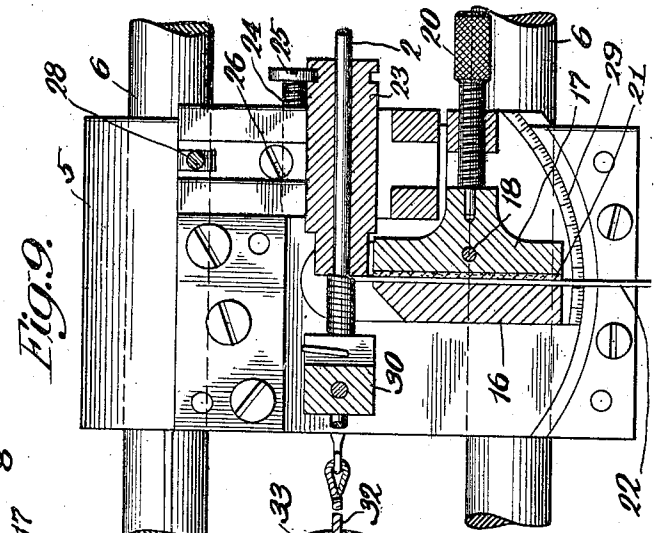

Fig. 9.

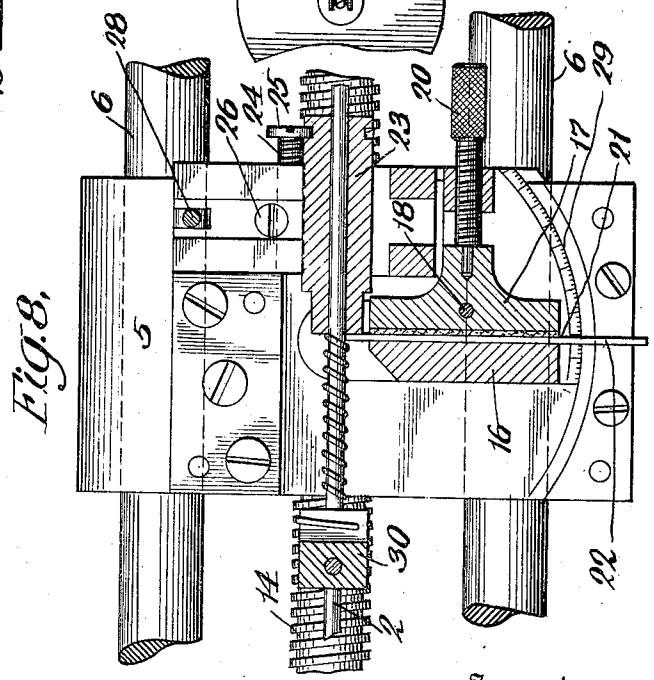

Fig. 8.

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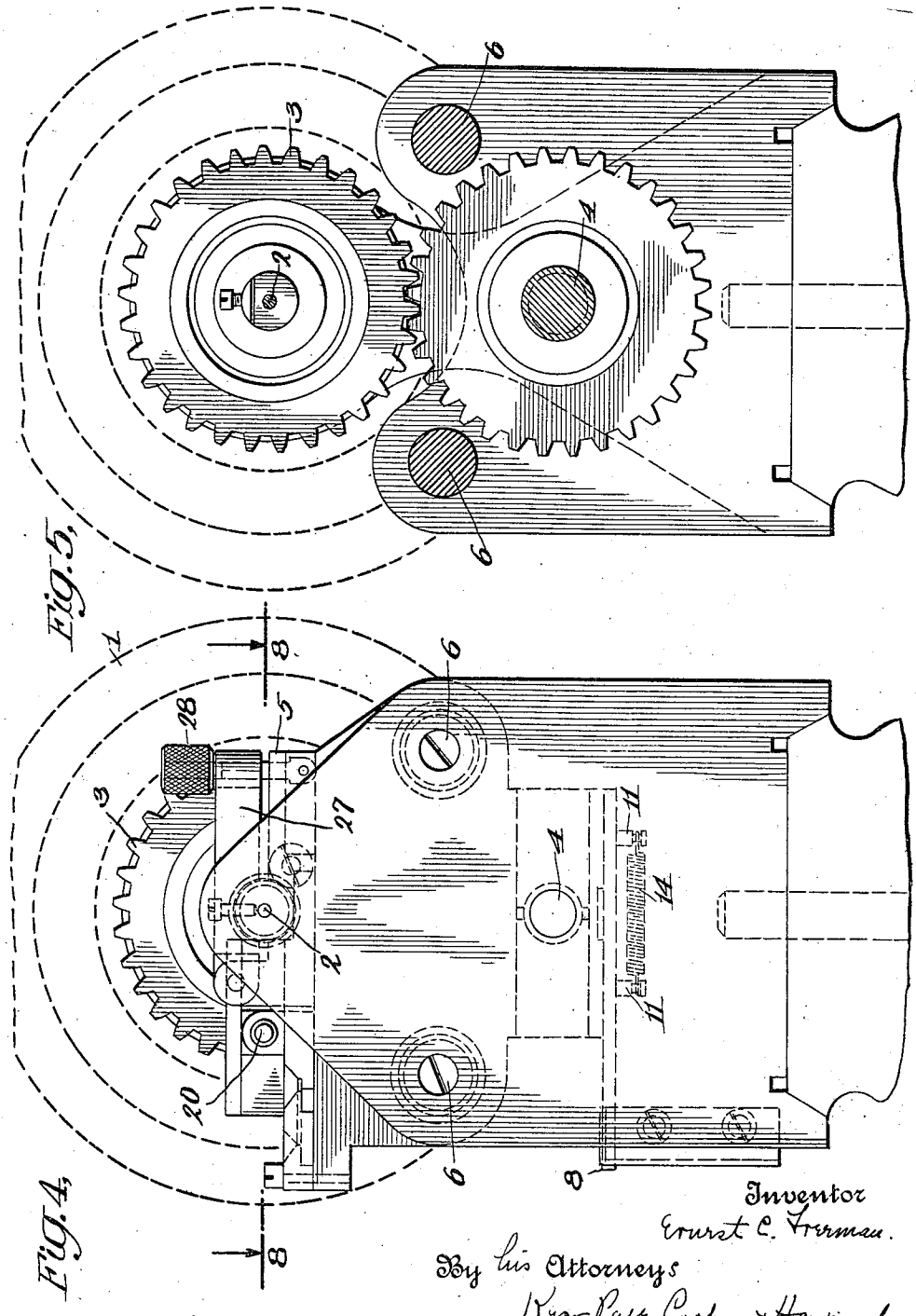

Fig. 5.

Fig. 4.

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5 sheets-sheet 5

Fig. 7.

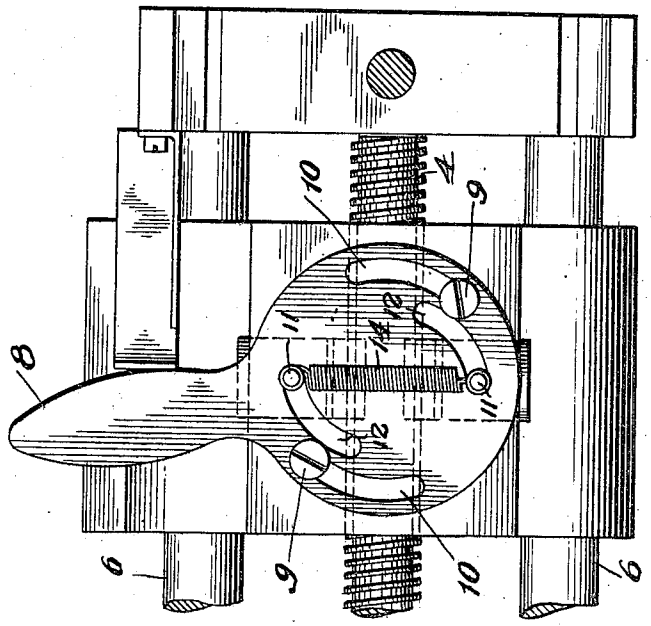
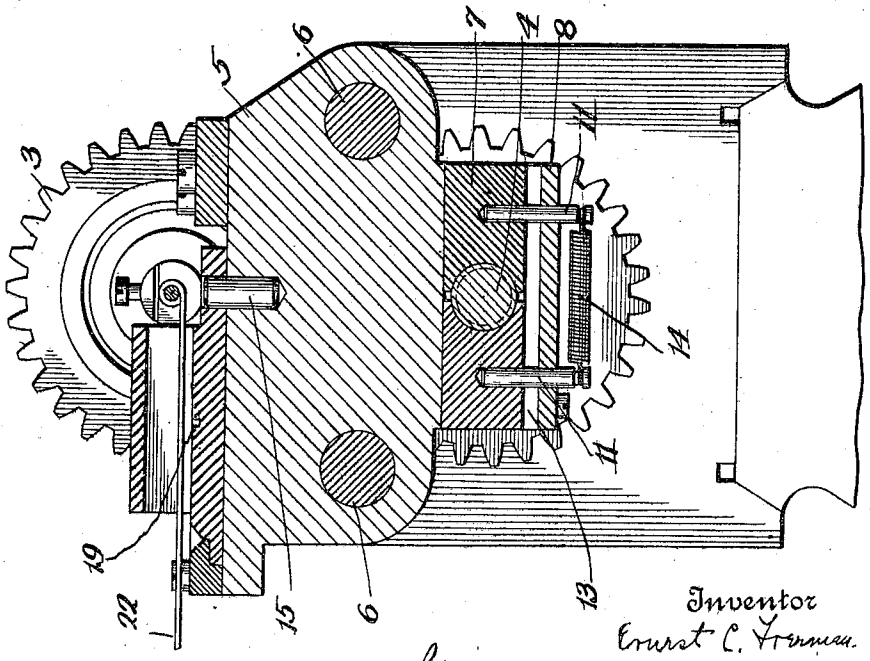


Fig. 6.



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Patented Mar. 6, 1923. 1,447,299

UNITED STATES PATENT OFFICE.

ERNEST CHAS. FREEMAN, OF APALACHIN, NEW YORK, ASSIGNOR TO THE INTERNATIONAL TIME RECORDING COMPANY, OF NEW YORK, A CORPORATION OF NEW YORK.

SPRING-WINDING DEVICE.

Application filed May 10, 1921. Serial No. 468,340.

To all whom it may concern:

Be it known that I, ERNEST C. FREEMAN, a citizen of the United States of America, residing at Apalachin, in the county of Tioga and State of New York, have invented certain new and useful Improvements in Spring-Winding Devices, of which the following is a full, clear, and exact description.

The invention which forms the subject of this application for Letters Patent is an improved spring winding device the nature and purpose of which may be readily understood from the following considerations well recognized as existing in all machine shops and plants devoted to the construction of more or less complicated machinery.

Many machines, such, for example, as tabulators, time recorders and the like, require often a great number of small coiled or tension springs for their proper operation, and it is essential that these be all of definite tensile strength and uniform in other respects in order to avoid complication in the means of adjustment. Such springs have habitually, heretofore, been made by hand by winding a wire of suitable metal about a mandrel or arbor, and cutting the wound wire into approximately the lengths required. This method is slow and from the very nature of things cannot result in the production of any quantity of uniform springs.

To avoid this objection I have devised a simple form of machine by which springs of any length and of perfectly uniform tension may be rapidly and cheaply produced, and the slow method of hand winding replaced by automatic production at a very greatly increased rate.

This machine is illustrated in the accompanying drawings in which:

Figure 1 is a view in side elevation of the complete machine.

Fig. 2 is a similar view of a modification which is used for winding closed springs.

Fig. 3 is a top plan view of the machine.

Fig. 4 is an end view of the same.

Fig. 5 is a sectional view on the line 5—5 of Fig. 1.

Fig. 6 is a section on the line 6—6 of Fig. 1.

Fig. 7 is a view of the under side of a carriage used in the device.

Fig. 8 is a section on the line 8—8 of Fig. 4.

Fig. 9 is a similar section of the modified form of machine.

The working parts are assembled in a suitable frame and are provided with a driving pulley or gear 1, by means of which rotation is imparted to a long arbor 2 upon which the springs are wound. In one form of the machine or that adapted to wind open springs, a gear wheel 3 on the driven shaft imparts rotation to a screw 4 extending longitudinally of the device and parallel with the arbor 2.

I provide a carriage 5 which is mounted to travel over guide rods 6 the full length of the machine, and carried by said carriage is a split nut 7 which embraces the screw 4 and by the rotation of the latter is advanced and moves the carriage at a rate determined by the pitch of the screw. This split nut is operated by a cam plate 8 which is secured to the carriage 5 by screws or pins 9 passing through concentric slots 10 in said plate, and pins 11, which are set in the two parts of the nut and extend out through slots 12 in the cam plate. The pins pass freely through the space 13 in the carriage under the split-nut and when adjusted by turning the cam plate close the split nut around the screw 4 or release it from engagement therewith. These pins 11 are connected by a spring 14 which draws them together and closes the split nut when the cam and the gear are removed and the machine used for winding a closed spring as will be hereinafter more fully set forth.

On the carriage 5 is also carried a tension clamp composed of a stationary part 16 and a movable part 17 swivelled on a pin 15 set in the carriage, and the movable part or jaw

of said clamp carries a pin 18 which rides in a slot 19 (Fig. 6) which permits the adjustment of the jaw 17 by a screw 20 and at the same time prevents said jaw from moving towards the arbor 2.

Between the two parts of the tension clamp is a strip of fibre 21 or any other suitable material which is more or less compacted by the clamp to regulate the tension upon a wire 22 which passes through the clamp in the winding process.

Mounted on the carriage is a bushing 23 surrounding the arbor 2. This bushing is adjustable by means of a screw 24 the head of which 25 enters a recess in the bushing 23 and which fits into the carriage, a screw 26 being employed to lock the adjusting screw in any position to which it may be set. The bushing is held in place by a swinging lever 27 locked down by a screw 28, Fig. 8.

In the operation of this machine a wire of proper character for a spring is passed through the tension clamp 16, 17, which is adjusted by the screw 20 to give the desired drag and hence tension on the wire. A scale 29 is used for determining the angle of tension which enables this to be retained at all times. The wire is made fast to a clamp 30 secured to the arbor 2 and after the bushing 23 has been properly adjusted to position the machine is started. By the rotation of the arbor the wire is wound thereon to form the spring, and as the arbor is rotated the carriage is advanced so that the convolutions of the spring will be open to an extent determined by the pitch of the screw 4. The cooperation of the rotating arbor, the traveling bushing and the tension clamp, produces a perfectly uniform spring. The length of the arbor is an arbitrary matter and more or less of it may be wound with wire according to the length of the spring required, or a long spring may be cut up into shorter sections.

When open springs are to be wound it is manifestly necessary to use the screw 4 for advancing the carriage, but when a closed spring is wanted the gears 3 and the screw 4 are not required and are removed. In their place a weight 31 is connected by a cord 32 passing over a pulley 33 with the carriage and opposes the movement imparted to it by the winding wire acting against the end of the bushing 23. The weight will vary under different conditions, such as diameter of the wire, and the like, but by its use a close spring will be wound which is perfectly uniform.

This device is a great labor-saver. By its use a very great quantity of perfectly uniform springs may be produced in a very short time, and in this way one of the most annoying obstacles to good and rapid shop practice is entirely avoided.

Having now described my invention, what I claim is:

1. In a spring winding device the combination with a rotary arbor and means for driving the same, of a traveling carriage and means intermediate the same and the said driving means adapted to advance the carriage in a line parallel with the arbor at a rate proportional to the open or closed character of the spring to be wound, a bushing on said carriage surrounding the arbor and adjustable thereon with reference to the line of travel of the wire on its way to the arbor, so that it may be brought into contact with the wire as it is formed on the mandrel into a spring, and a tension device also carried by the carriage through which the wire passes on its way to the arbor.

2. In a spring winding device the combination with an arbor, means for rotating the same, and a screw rod also rotated by said means, of a carriage, longitudinal supports for the same, the said carriage engaging with the said screw rod and adapted to be advanced thereby, a bushing mounted on the carriage and adapted to slide along the arbor, a tension clamp also mounted on the carriage, and means for adjusting the position of the bushing upon said carriage longitudinally with respect to said arbor, so that it may be brought into contact with the wire as it is formed on the mandrel into a spring.

3. In a spring winding device the combination with an arbor, means for rotating the same, and a screw rod parallel with said arbor also rotated by said means, of a carriage, means carried thereby for throwing it into or out of engagement with the screw rod whereby it may be advanced or not thereby, a bushing mounted on the carriage and surrounding and sliding over said arbor, means for adjusting the position of said bushing on the carriage relatively to the line of travel of the wire in passing to the arbor, so that it may be brought into contact with the wire as it is formed on the mandrel into a spring, and a tension clamp also mounted on the carriage through which the wire passes on its way to the arbor.

In testimony whereof I hereto affix my signature.

ERNEST CHAS. FREEMAN.