

Apr. 17, 1923.

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F. H. SLEEPER

SPRING COILING MACHINE

Filed March 18, 1921

2 Sheets-Sheet 1

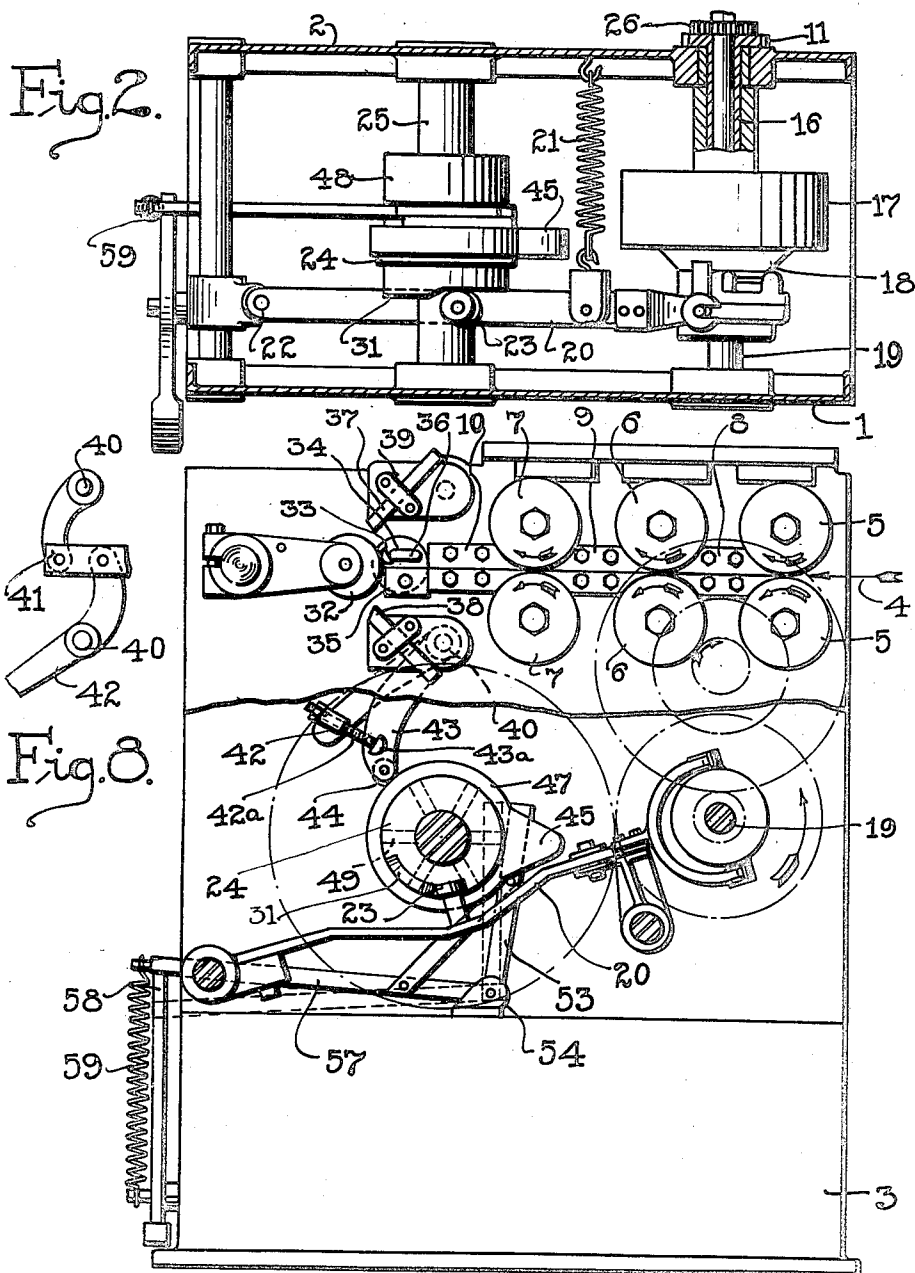


Fig. 8.

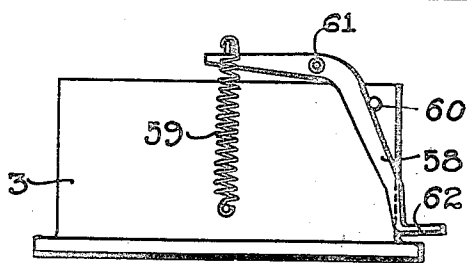


Fig. 1.

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2 Sheets-Sheet 2

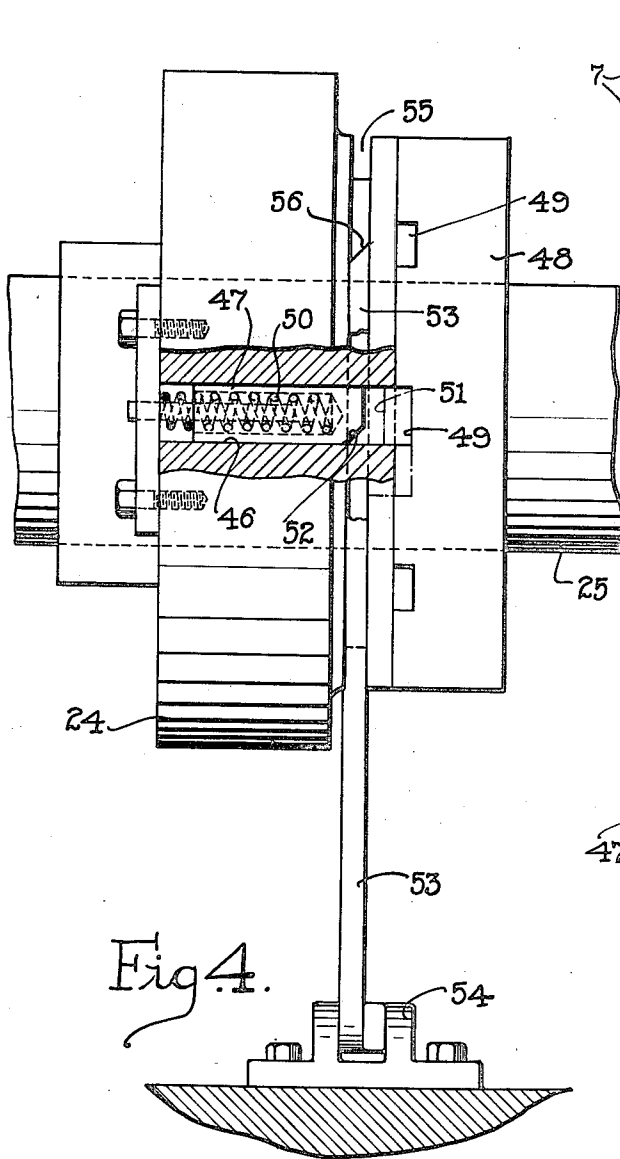


Fig. 4.

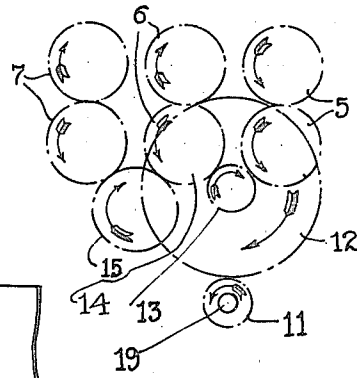


Fig. 7.

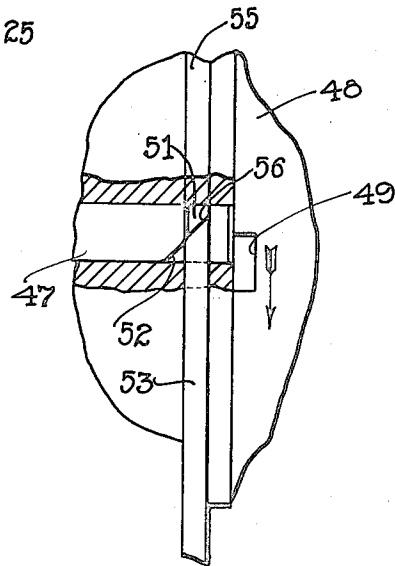


Fig. 5.

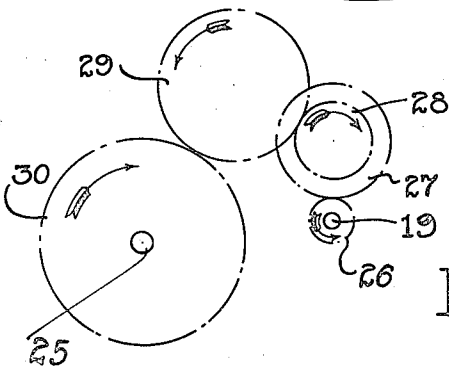


Fig. 6.

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UNITED STATES PATENT OFFICE.

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SPRING-COILING MACHINE.

Application filed March 18, 1921. Serial No. 453,279.

To all whom it may concern:

Be it known that I, FRANK H. SLEEPER, a citizen of the Dominion of Canada, residing at Worcester, in the county of Worcester and Commonwealth of Massachusetts, United States of America, have invented a new and useful Improvement in a Spring-Coiling Machine, of which the following, together with the accompanying drawings, is a specification.

My invention relates to improvements in machines for forming or coiling wire springs, and particularly to that type of spring coiling machines having feed rolls adapted to feed the wire to devices which form the wire into springs.

Such prior coiling machines have also been provided with devices for severing the fed wire near the coiling point after a predetermined length of wire has been coiled, provision being made for interrupting the feeding devices prior to the operation of the wire severing devices, in order to allow the completed spring to drop before the coiling of the next spring has begun. Spring coiling machines of the above described type are adapted to continuously produce springs each containing a predetermined length of wire, but when it is desired to produce springs of different length, the operation of the machine must be interrupted to permit adjustment of the wire feeding and severing mechanisms.

According to the present invention, I propose to provide a coiling machine of the above described type with means whereby springs of any desired length may be formed at the will of the operator, without interrupting the operation of the machine or necessitating any changes in the adjustment thereof. These and other advantageous features of my invention will hereinafter more fully appear, reference being had to the accompanying drawings, in which—

Fig. 1 is a view in front elevation of a coiling machine embodying my invention.

Fig. 2 is a plan view of the machine shown in Fig. 1, with the cover removed, and certain parts shown in section.

Fig. 3 is a side view of a portion of the machine shown in Fig. 1, showing the arrangement of the tripping lever.

Fig. 4 is a detail view, partially in section, showing the arrangement of my im-

proved device for controlling the coiling operation.

Fig. 5 is a fragmentary view showing certain of the parts shown in Fig. 4 in a different position.

Fig. 6 is a diagrammatic view illustrating the gearing for driving the cam shaft of the machine.

Fig. 7 is a diagrammatic view illustrating the gearing for driving the feed rolls of the machine.

Fig. 8 is a fragmentary view showing the operation of the wire severing devices.

Similar reference characters refer to similar parts in the different figures.

Referring to Figs. 1 and 2, the machine generally comprises upright sides or housings 1 and 2 mounted upon a suitable base 3, the various spring forming tools and their associated operating members being mounted upon and between the housings 1 and 2. The horizontal line of the wire feed is indicated by the arrow at 4, where the wire enters between the feed rolls.

A plurality of pairs of feed rolls 5, 5, 6, 6 and 7, 7 are adapted to grip the wire and to feed it forward to the coiling tools. Grooved guides 8 and 9 are provided between the feed rolls 5 and 6, and similarly grooved guides 10 are provided to receive the wire from the rolls 7. As illustrated in Fig. 7, the several pairs of feed rolls 5, 6 and 7 are geared together for synchronous rotation, the drive being from a pinion 11 through gears 12, 13, 14 and 15. The driving pinion 11 is formed on a sleeve 16 which extends through the housing 2 and is connected to the driven member 17 of a clutch of any ordinary construction.

The driving member 18 of the clutch is slidably mounted on a shaft 19 that is connected to a suitable source of power, not shown. The driving member 18 is adapted to be moved longitudinally on the shaft 19 by means of a shifting arm 20 and is normally held in operative engagement with the driven member 17 by means of a spring 21, connected at its ends to the arm 20 and the housing 2. The arm 20 is pivotally mounted at the point 22 and is provided with a roller 23 intermediate its ends. The spring 21 serves to hold the roller 23 in engagement with the end surface of a cam member 24, which is loosely mounted on a

shaft 25 extending between the housings 1 and 2.

A driving pinion 26 is also mounted on the shaft 19, and as best shown in Fig. 6, is operatively connected to the cam shaft 25 through gears 27, 28, 29 and 30 which are not shown in Fig. 2. The cam shaft 25 is thus adapted to be continuously driven from the shaft 19. The cam member 24 is normally connected to rotate with the shaft 25 by a device which will be hereinafter more fully described, so that the roller 23 on the arm 20 will be engaged by a cam projection 31 on the cam member 24 during each revolution of the shaft 25. When the roller 23 is so engaged by the cam projection 31, the arm 20 is moved against the spring 21 to withdraw the driving member 18 from operative engagement with the driven member 17 of the clutch. In this way the train of gears driving the feed rolls is adapted to be disconnected from the shaft 19 for a predetermined interval in each revolution of the cam shaft 25.

The feed rolls 5, 6 and 7 are adapted to deliver the wire through the guide 10 to a coiling point 32 which deflects the wire either under or over an arbor 33, according to whether it is desired to produce a right hand or a left hand spring. The arbor 33 is mounted on a suitable tool holder 34 and a guide 35 is also mounted on the holder 34 to direct the wire around the arbor 33. A pitch tool 36 is also mounted on the holder 34 adjacent to the arbor 33. A cutting tool 37 is adapted to cooperate with the arbor 33 to sever the wire, and a similar cutting tool 38 is provided below the tool holder 34 for cooperation with the arbor 33 when a right hand spring is being coiled. The cutting tools 37 and 38 are carried on heads 39 which are adapted to turn with shafts 40. As best shown in Fig. 8, the shafts 40 are connected by a linkage mechanism 41, and are adapted to be turned in unison, but in opposite directions, by means of a lever 42 mounted on the lower shaft 40. The lever 42 carries a bolt 42^a which is adapted to engage a lug 43^a provided on an arm 43.

The arm 43 is loosely mounted on the shaft 40 and is provided at its end with a roller 44 in contact with the periphery of the cam member 24 and adapted to be engaged by a cam projection 45. When the roller 44 is engaged by the cam projection 45, the arm 43 is lifted and this movement is transmitted through the lever 42 to the shafts 40 to cause one of the cutting tools 37 or 38 to be moved toward the coiling arbor 33 and sever the wire. The cam projection 45 is so related to the cam projection 31 that the wire will be severed immediately after the stoppage of the feed rolls by the mechanism previously described.

From the foregoing, it is apparent that the coiling machine described thus far is adapted to continuously produce springs each containing a predetermined length of wire, the completed springs being automatically severed from the wire following each interruption of the feeding devices. The machine will continue to operate in this manner as long as the cam member 24 is connected to the shaft 25 and it is obvious that in order to change the length of the springs being coiled, it would be necessary to interrupt the operation of the machine and make certain adjustments in the form of the projections 31 and 45 on the cam member 24. The present invention resides in the provision of means whereby springs of different lengths may be coiled at the will of the operator, without interrupting the operation of the machine. To this end, means are provided for controlling the connection of the cam member 24 to the shaft 25, so that the operation of the wire feeding and severing devices may be directed by the operator.

Referring now to Figs. 1 and 4, the cam member 24 is provided with a slot 46 within which is adapted to slide a bolt 47. A clutch plate 48 is mounted on the shaft 25 adjacent to the cam member 24 and is provided with a plurality of radial slots 49 which are formed in the surface of the plate facing the cam member 24. The bolt 47 is adapted to be forced in the direction of the clutch plate 48 by means of a spring 50, so that when the plate 48 turns with the shaft 25, the end of the bolt 47 is adapted to enter one of the slots 49. When the bolt 47 is received in one of the slots 49, the cam member 24 is driven with the shaft 25, and the machine operates as described above. The bolt 47 is provided with a slot 51 extending across the face thereof and having one end bevelled, as shown at 52. As best shown in Fig. 1, a shifting arm 53 extends vertically upward from the base 3 of the machine and is pivotally mounted at its lower end in a bracket 54. The upper portion of the arm 53 is opposite to a peripheral groove 55 that is provided on the cam member 24. The upper end of the arm 53 is bevelled, as shown at 56, to correspond to the bevelled portion of the slot 51. The arm 53 is connected to an arm 57 which projects beyond the ends of the housings 1 and 2, and is held in engagement with the end of a tripping lever 58 by means of a spring 59. The spring 59 also tends to turn the arm 53 so as to move it into the groove 55, but this movement is normally prevented by means of a pin 60, which prevents the lever 58 from turning in a counterclockwise direction about its pivot 61. The lever 58 is provided with a foot pedal 62 by means of which it may be readily operated. So long as the pin 60

prevents turning movement of the lever 58 and the arm 53 by the spring 59, the arm 53 will be held out of the groove 55, the bolt 47 will remain in the position shown in Fig. 4, and the cam member 24 will be driven by the shaft 25.

When it is desired to disconnect the cam member 24 from the shaft 25, the operator withdraws the pin 60 which frees the lever 58 and allows the spring 59 to move the arm 53 into the groove 55, as shown in dotted lines in Fig. 1. The bevelled portion 56 of the arm 53 is then in position to engage the bevelled portion 52 of the bolt 47, and further turning movement of the cam member 24 will cause the bolt 47 to be withdrawn from the slot 49, as indicated in Fig. 5. The cam member 24 will then remain stationary on the shaft 25 while the plate 48 turns, as indicated by the arrow, and the feed rolls will then be driven without interruption so long as the drive shaft 19 continues to rotate. The severing devices will also be rendered inoperative, so that the machine will coil a continuous spring so long as the bolt 47 is held in its retracted position. Whenever it is desired to interrupt the coiling, it is only necessary for the operator to depress the foot pedal 62 and thereby withdraw the arm 53 from the slot 51. The cam member 24 will thereupon be again connected to the shaft 25 by the bolt 47, and the wire feeding and severing devices will operate as before.

From the foregoing, it is apparent that by the embodiment of my invention in a spring coiling machine, it is possible to coil springs of different lengths, at the will of the operator. Thus, the machine may be operated to form a desired number of springs, each containing a predetermined length of wire, and then, without interrupting the operation of the machine or making any adjustment whatsoever, a number of springs of any desired length may be coiled and severed, by merely manipulating the tripping lever 58. The flexibility and the variety of the output of the machine is thereby greatly increased.

While I have shown my invention as applied to a particular type of spring coiling machine, it is not so limited, but may as

well be applied to other machines having automatic wire feeding and spring severing devices. I desire therefore that only such limitations be imposed thereon as come within the scope of the appended claims.

I claim,

1. In a spring coiling machine, the combination with wire feeding devices, coiling tools, a wire severing device, and means for automatically interrupting the operation of the feeding devices and for operating the severing device after a predetermined length of wire has been coiled, of means for manually rendering the wire feed interrupting and severing devices inoperative to permit the coiling of any desired length of wire.

2. In a spring coiling machine, the combination with a rotating actuating member, wire feeding devices connected to said member, coiling tools and means for automatically disconnecting said feeding devices from said member after a predetermined length of wire has been coiled, of means for manually rendering said disconnecting means inoperative to permit the coiling of any desired length of wire.

3. In a spring coiling machine, the combination with a rotating shaft, wire feeding devices connected to said shaft through a clutch, coiling tools and cam operated means for disengaging said clutch to interrupt the operation of said feeding devices after a predetermined length of wire has been coiled, of means for rendering said cam operated means ineffective to permit the coiling of any desired length of wire.

4. In a spring coiling machine, the combination with a rotating shaft, wire feeding devices connected to said shaft through a clutch, coiling tools and a cam shaft driven from said rotating shaft, of a cam member mounted on said cam shaft and adapted to disengage said clutch upon the coiling of a predetermined length of wire, and means for controlling the connection of said cam member to said cam shaft.

Dated this fourth day of March 1921.

FRANK H. SLEEPER.

Witnesses:

T. F. DELAHUNT,
E. A. COX.