Aug. 18, 1953 L. A. BORDER 2,649,130

COIL SPRING WINDER

Filed March 9, 1951 2 Sheets-Sheet 1

Fig. 1.

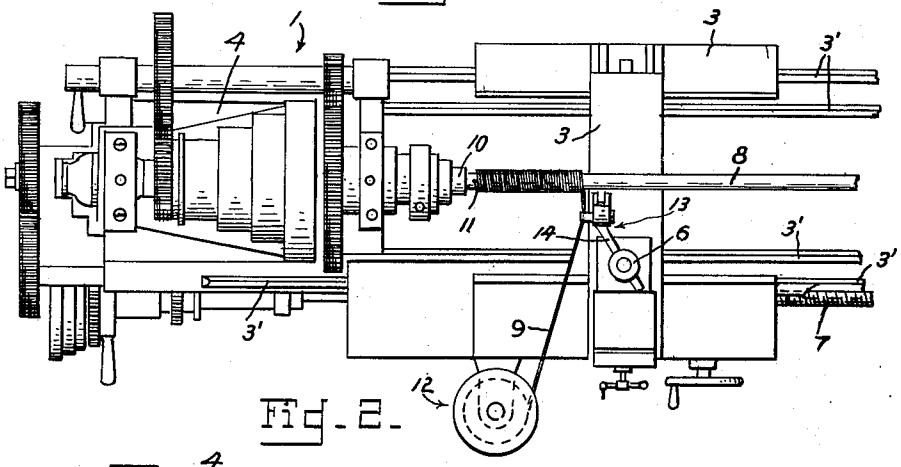


Fig. 2.

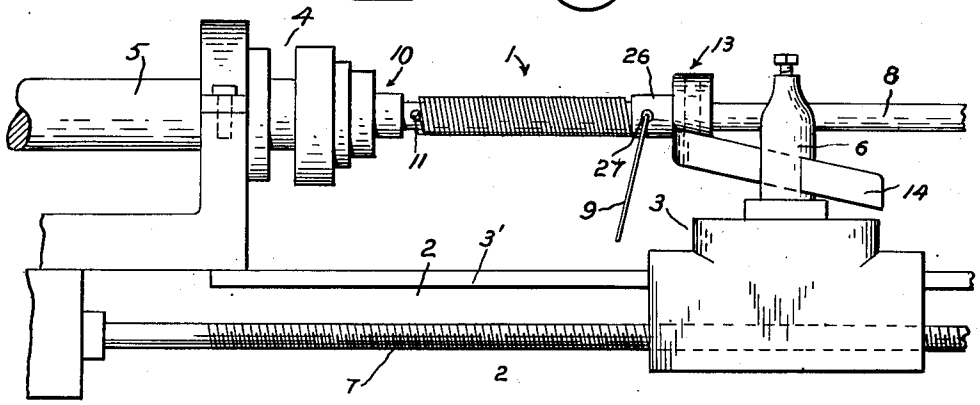
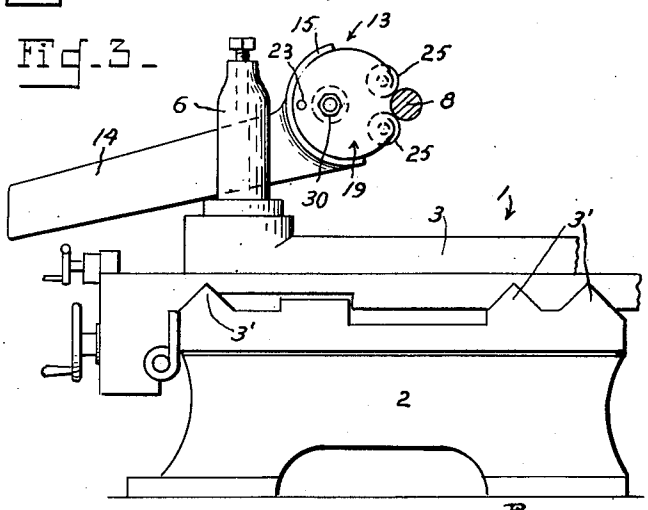


Fig. 3.



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Aug. 18, 1953 L. A. BORDER 2,649,130

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Filed March 9, 1951 2 Sheets-Sheet 2

Fig. 4.

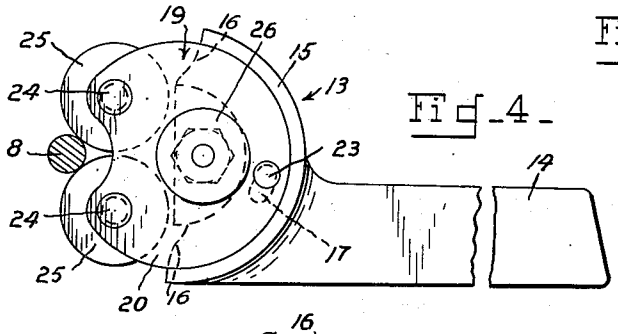


Fig. 7.

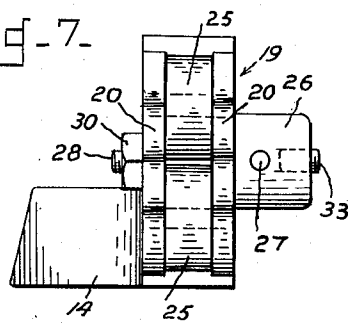


Fig. 5.

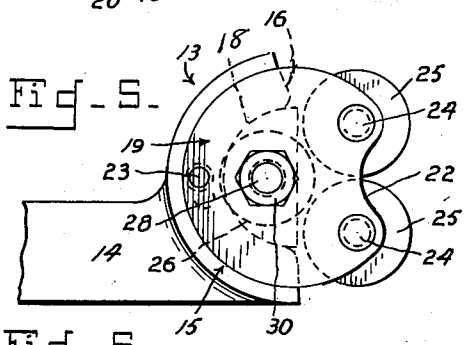


Fig. 8.

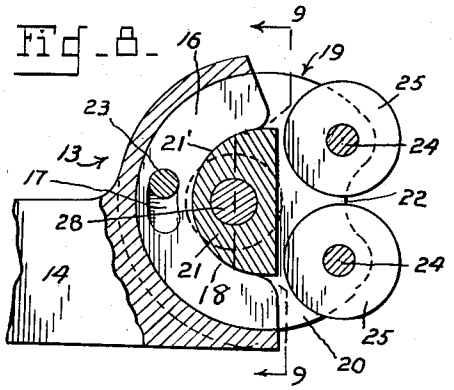


Fig. 6.

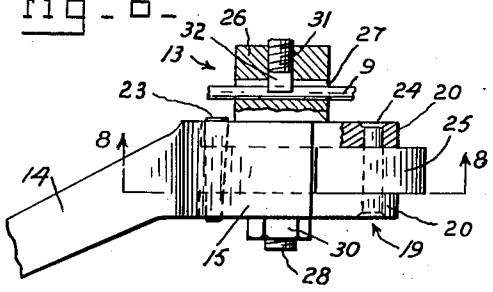


Fig. 10.

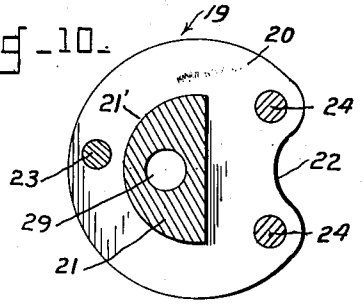


Fig. 9.

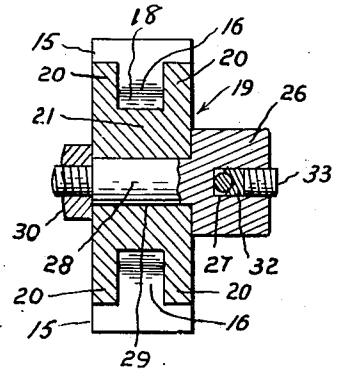
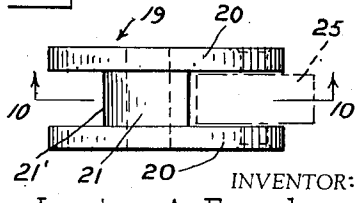


Fig. 11.



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COIL SPRING WINDER

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Application March 9, 1951, Serial No. 214,760

2 Claims. (Cl. 153—67)

1

This invention relates to certain new and useful improvements in coil spring winders, and particularly to means for winding helical springs for various uses for which such springs are designed.

The primary object of the invention is to provide simple, reliable and efficient means for winding springs of this type of any desired length, diameter and pitch and under any desired winding tension.

Another object of the invention is to provide a novel construction of mandrel supporting and wire guiding device which may be mounted upon the tool post or lathe for engagement with and travel along the lathe mandrel and operation by the lathe feed shaft to guide the wire for a winding action about the mandrel to form the spring coil, which guiding device embodies rollers to engage the mandrel and support the latter against deflection and means permitting adjustment of the rollers to different angular positions relative to the tool post and mandrel to set the guiding device to a reliable and efficient guiding position to suit the gauge of the wire and feed angle of the wire and enable it to be fed to the mandrel without binding at any desired tension.

Still another object of the invention is to provide novel adjustable supporting means for the rollers whereby their automatic adjustment is effected to properly set the guiding device when said device is mounted in or upon the tool post.

Still another object of the invention is to provide a guiding device by means of which a simplified construction of machine for supporting and driving the mandrel and feeding the tool post may be employed, in which the mandrel may be supported on the machine at its driven end only, leaving its opposite end free, the guiding tool serving in its travel as the support for the mandrel between its driven and free ends, whereby a coil winding machine as such, of less cost than a lathe, may be supplied for spring winding uses.

Still another object of the invention is to provide a wire guiding device having wire tensioning means which is adjustable with the rollers to guide the feeding wire at the proper angle and under the proper tension to the winding mandrel.

With these and other objects in view, which will appear in the course of the subjoined description, the invention consists of the novel features of construction, combination and arrangement of parts, hereinafter fully described

2

and claimed, and shown in the accompanying drawings, in which:

Fig. 1 is a top plan view of a coil winding machine employing my improved supporting and guiding tool and showing the manner of winding a coil spring.

Fig. 2 is a view in front elevation of salient parts of the machine and the supporting and guiding tool.

Fig. 3 is an end elevation of the same.

Fig. 4 is a side elevation of the supporting and guiding tool on an enlarged scale showing the rollers thereof in engagement with the winding mandrel.

Fig. 5 is a view similar to Fig. 4 looking toward the opposite side of the supporting and guiding tool.

Fig. 6 is a view partly in section, of the supporting and guiding tool.

Fig. 7 is a front end elevation thereof.

Fig. 8 is a vertical longitudinal section through the head of the supporting and guiding tool taken on line 8—8 of Fig. 6.

Fig. 9 is a vertical transverse section through the head of the supporting and guiding tool taken on line 9—9 of Fig. 8.

Fig. 10 is a front-to-rear vertical section through the center of the head of the supporting and guiding tool.

Fig. 11 is a top plan view of the head.

Referring now more particularly to the drawings, 1 designates a machine of a type in connection with which my invention may be used, which machine is shown as comprising a base frame 2 having guides 3' for a slide rest or carriage 3, a headstock 4 carrying a driving spindle 5 driven by suitable gearing, a tool post 6 mounted on the slide rest or carriage 3, and a feed screw or shaft 7 driven by the gearing and which imparts feed motion to the slide rest or carriage. In accordance with my invention a winding shaft or mandrel 8, on which the wire 9 is wound to form the spring, is connected at one end to a chuck 10 carried by the driving spindle whereby the mandrel is rotated for a coil winding action as the slide rest or carriage is fed by the shaft 7, parallel therewith, longitudinally of the machine. The machine as thus constructed may be a conventional type of lathe having a tailstock to support the tail end of the mandrel, or it may be a similar type of machine devoid of a tailstock, as the use of a tailstock is not necessary to the carrying out of my invention, or the machine may be one of any suitable type for driving a winding mandrel and a feed shaft

and cooperating means for supporting and transmitting motion to my improved supporting and guiding tool. The mandrel 8 may be provided at its head end with an opening 11 or other holding means for holding one end of the wire which is being wound to form the spring, and the mandrel and cooperating parts may be designed to wind a compression or tension spring of any desired length, diameter and force or strength within any required limits. The wire may be supplied to the winder from a spool 12 mounted on the slide rest or any suitable support properly arranged for the feed of the wire to the winder.

I provide a device or tool 13 adapted to be mounted on the tool post 6 for guiding the wire under proper tension and also partly or wholly supporting the mandrel against deflection during a coil winding operation. This device or tool comprises a mounting arm or shank 14 formed to be adjustably fitted and secured in the tool post 6 and provided at its forward end with a partly circular saddle or seat plate 15, the concaved side of which, in the applied position of the tool 13, faces the mandrel 8. The saddle is provided at its concaved side with a guide flange 16 formed with an arcuate slot 17. This flange has a concaved guide face 18 and serves as a support and guide for a bearing head 19.

The bearing head 19 comprises a pair of disk like side plates 20 united by a central hub 21 having a curved rear bearing face 21', which disks or plates are of circular form except at the front where they are cut away to provide clearance recesses 22. The rear portions of the disks or plates 20 are arranged to fit within the saddle 15 on opposite sides of the flange 16 with their forward portions projecting beyond the saddle and with the hub 21 disposed in front of the flange 16 so that the rear portions of the peripheries of the disks engage the concaved face of the saddle and the curved surface 21' of the hub engages the concaved face 18 of the flange 16. A transverse retaining and pivot pin 23 passes through openings in the disk and the slot 17 and forms a fastening connection whereby the head 19 is secured to the saddle but pivoted thereto so that it may swing or tilt in a vertical plane within the limit allowed by the slot 17. The formation of the recesses 22 provides the disks with ear-like projections apertured for the reception of bearing pins 24 on which are rotatably mounted upper and lower bearing and guiding rollers 25 which project beyond the disks and are spaced sufficiently to receive between them a portion of the mandrel and to engage the mandrel above and below the horizontal longitudinal center thereof, as shown in Fig. 3, so that in the travel of the tool 13 the rollers will rotate against the mandrel as the mandrel rotates and at the same time slide along the mandrel. The head 19 is thus mounted to pivot about saddle 15 by the arcuate and contacting faces of the saddle and flange 16, and of the side plates 20 and hub 21, respectively, the pin 23 and slot 17 retaining the head 19 for limited pivotal movement relative to the saddle 13 in a vertical plane which contains the rollers 25 and which extends transversely to the mandrel.

The pivotal connection between the head 19 and shank 14 adapts the head to adjust itself to different angular positions relative to the shank and mandrel in applying the tool 13 for use, and also adapts the rollers to adjust themselves so as to maintain a proper bearing contact between

the same and the mandrel to prevent binding and undue friction between the bearing head and mandrel. When so adjusted the friction between the contact surfaces of the saddle and head is sufficient to maintain the parts in adjusted relationship and the rollers in position to support the mandrel against deflection, as hereinafter described.

Arranged at one side of the head is a wire guiding and tensioning device comprising a guide head 26 of circular or other suitable form and having a diametrical feed opening 27 for the travel of the wire therethrough. This head is provided with a journal pin 28 which passes through a bearing opening 29 in the disks 20 and hub 21 and has a reduced and threaded free end for the reception of a retaining nut 30. The head 26 is thus mounted to turn to different angular positions to adjust itself automatically to the working angle of the head 19 and the required angularity of feed of the wire. The head 26 is provided with a bore 31 which intersects the opening 27 and has arranged therein a plunger 32 adjustable by a screw 33 to regulate the tension of the feeding wire.

In the operation of the machine one end of the wire passing through the tension device is engaged with the opening 11 or other holding means to fix it to the mandrel, and then the machine is set into operation to rotate the mandrel and cause the slide rest, tool post and tool 13 to travel from the head end toward the tail end of the mandrel, during which the wire is wound about the mandrel to form a coil in an obvious manner. As the tool 13 travels along the mandrel the rollers rotate in contact with the mandrel and slide therealong, thus reducing friction, and the rollers support and hold the mandrel from deflection from a true path of rotation. Such deflection of an intermediate position of the mandrel often occurs under the winding tension even in the use of a lathe or other machine in which the mandrel is supported at both ends, as by head and tail stocks, which causes the coil convolutions to be misformed or wound under different tensions, with the result that an imperfect coil is produced. My invention overcomes this objection even in the event that the mandrel is not supported on the machine at its tail end, as the tool 13 holds the mandrel against deflection so that it rotates in a true path. It is to be understood that the device 13 may be used in connection with a lathe in which a winding mandrel is driven by the lathe driving spindle and supported by head and tail-stocks, but the tool 13 permits of the use of a simple type machine devoid of a tail stock and in which the mandrel is supported between its head and tail ends by said tool, which mandrel and tool post may be operated by any suitable type of gearing, allowing either a lathe or a less expensive type of machine to be used as the main supporting and driving means. This is an important advance in that it permits of the use of a lathe, when a shop is so equipped, or the use of a less expensive machine in shops not so equipped, and where a less expensive machine will serve all desired purposes. If, however, a shop is equipped with a lathe or equivalent machine, it is only necessary for such a shop to employ my invention to adapt the lathe for use in making coiled springs when desired.

From the foregoing description, taken in connection with the drawings, the construction and mode of operation of my invention will be read-

ily understood and its advantages appreciated by those versed in the art without a further and extended description. While the construction of my improved supporting and guiding device as shown is preferred, I do not limit my invention thereto, as obviously changes in the construction, form and arrangement of the parts, such as fall within the scope of the appended claims, may be made without departing from the spirit or sacrificing any of the advantages of the invention.

Having thus described my invention, I claim:

1. A coil winding machine including in combination a rotary winding mandrel, a tool holder mounted to travel in a path parallel with the mandrel, and a mandrel engaging and wire guiding device carried by the tool holder and embodying a shank engaging the tool holder and provided with an arcuate saddle facing the mandrel and having a central flange, a head formed of side plates arranged on opposite sides of the flange and a hub arranged in advance of the flange, means pivotally connecting the side plates with the flange to permit the head to have limited tilting movement in a vertical plane, rollers carried by the head to engage and rotate against and slide along the mandrel in a coil winding operation, a wire guide and tensioning member arranged alongside the head, and means connecting said member with the plates and hub and pivoting said member to the head.

2. A device for use in supporting a wire coiling mandrel and guiding a wire feeding thereto, comprising a shank for engagement with a tool holder movable along the mandrel, said shank having an arcuate saddle provided with a concaved face and a central flange projecting forwardly from said face and having a concaved forward surface, a head formed of side plates disposed on opposite sides of the flange and a hub connecting said side plates and having a concaved forward surface, said plates having curved peripheral surfaces in bearing engagement with the concaved face of the saddle and said hub having a curved surface in bearing engagement with the concaved forward surface of said flange, rollers arranged between and journaled on the side plates of the head to engage and rotate against and slide along the mandrel, and a pivot pin passing through said side plates and an arcuate slot in said central flange for pivoting said head to said saddle to permit said head to have limited tilting movement in a vertical plane which contains said rollers and which extends transversely to said mandrel.

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