



(12)

EUROPEAN PATENT APPLICATION

(21) Application number : **92830408.8**

(51) Int. Cl.⁵ : **B21F 11/00**

(22) Date of filing : **23.07.92**

(30) Priority : **01.08.91 IT MI912153**

(43) Date of publication of application :
03.02.93 Bulletin 93/05

(84) Designated Contracting States :
DE ES FR

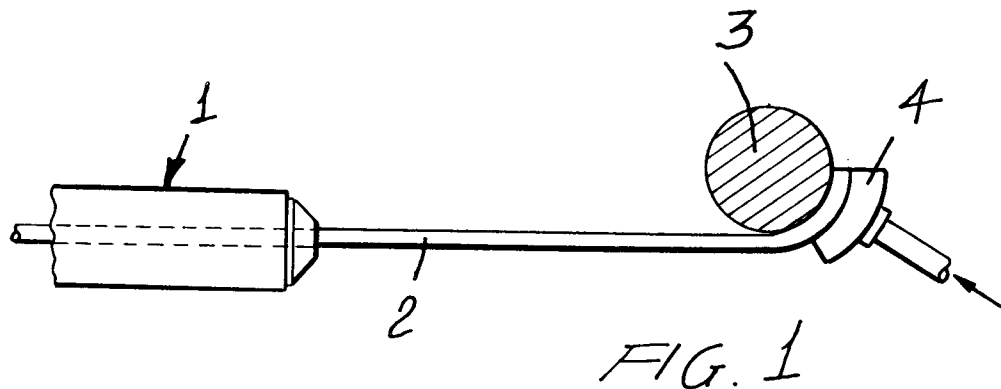
(71) Applicant : **OMD OFFICINA MECCANICA
DOMASO S.p.A.
Via Statale, 193
I-22013 Domaso (Como) (IT)**

(72) Inventor : **Kunz, Hans, c/o OMD Officina
Mec.Domaso S.p.A.
Via Statale 193
I-22013 Domaso (Como) (IT)**

(74) Representative : **Cicogna, Franco
Ufficio Internazionale Brevetti Dott.Prof.
Franco Cicogna Via Visconti di Modrone, 14/A
I-20122 Milano (IT)**

(54) **Apparatus for making start shank-free springs wound either leftwardly or rightwardly.**

(57) The present invention relates to an apparatus for making springs without starting shank, which are wound either rightwardly or leftwardly, comprising a wire guide element (1), adapted to supply the wire (2) to be wound on a mandrel (3), thereon a clamp (4) operates for holding the starting end portion of the spring (10). The main feature of the invention is that the apparatus further comprises an unit for cutting the ends of the wires of the made spring (10), which cutting unit (15) is arranged on the side of the wire guide element (1) opposite to the spring (10), and is adapted to cut the spring wire (2) so as to leave at a free end portion thereof, constituting the start portion (2a) of the next spring, a circumference quadrant shaped sector.



BACKGROUND OF THE INVENTION

The present invention relates to an apparatus for making springs without shank, wound either rightwardly or leftwardly.

There are already commercially known apparatus for making wire springs, in which the wire is pulled from a supply coil supported on an winder device in a wire guide unit, under the jaw or clamp assembly of a hydraulic mandrel.

This jaw assembly is provided for holding the start of the spring wire in a fixed condition above a winding bar, and the winding bar is rotatively driven by the mandrel, whereas the spring wire guide unit is driven with a preset speed in parallel to the winding bar axis, from the mandrel toward the end of the winding bar.

Thus, by the two mentioned movements, it is possible to wind coil springs, either with or without pitch.

After having achieved a given length of the spring, the mandrel rotary movement is caused to stop, the mandrel jaw assembly is opened and, by means of the spring wire guide unit, the spring, which is still connected to the wire pulled from the wire coil, is removed from the winding bar and brought under a cutting unit.

The cutting operation is performed vertically, from the top to the bottom, on the last turn of the spring, whereas the wire for forming the spring is supplied in a substantially horizontal direction.

With the disclosed method there is obtained that the start of the spring wire has already a semi-circumference shape, and the spring being cut without shank, that is there is directly cut out the last turn of the spring.

After the cutting step, the wire guide unit is automatically returned to its starting position, so as to bring the semi-circumference shaped start portion under the mandrel jaw assembly.

Then, the jaw assembly is closed on the end portion of this wire half circle and locks it on the winding bar, so as to automatically repeat all of the above mentioned making steps.

By providing a semi-circumference portion on the end portion of the spring wire, at the cutting step, it is possible to preset the start of the new spring, which will be lacking of a stright wire portion, to be cut away during a subsequent step, thereby providing a perfectly cylindrical spring.

While the disclosed apparatus is operatively valid under several aspects, it has the great drawback that it allows exclusively rightwardly wound springs to be made.

In fact, if one would desire to also make leftwardly wound springs, in order to obtain the half starting spring turn, it would be necessary to cause the cutting unit to operate from the bottom to the top, or the wire would be caused to enter the rear portion of the ap-

paratus, and this apparatus should be provided with a second spring wire guide unit on its rear portion.

This, as it should be apparent, renders the apparatus very complex construction-wise, in addition to increasing remarkably the size thereof.

SUMMARY OF THE INVENTION

Accordingly, the aim of the present invention is to provide an apparatus for making springs without starting shank, wound either rightwardly or leftwardly, which permits the wire to be suitably provided with a start shaped or contoured portion, independently from the winding direction of the spring, and without the provision of a second cutting unit or a second spring wire guide element.

Within the scope of the above mentioned aim, a main object of the present invention is to provide such an apparatus which has a very reduced size, and being furthermore adapted to always operate with a front wire supply and with a single wire guide unit which can be vertically adjusted in order to drive the wire both under and above the winding bar.

Yet another object of the present invention is to provide such a spring making apparatus which is very reliable and safe in operation.

Yet another object of the present invention is to provide an apparatus for making springs without starting shank, wound either rightwardly or leftwardly, which can be easily made starting from easily commercially available elements and materials and which, moreover, is very competitive from a mere economic standpoint.

According to one aspect of the present invention, the above mentioned aim and objects, as well as yet other objects, which will become more apparent hereinafter, are achieved by an apparatus for making springs without starting shank, wound either rightwardly or leftwardly, said apparatus being adapted to supply the wire to be wound on a mandrel, thereon operates a jaw assembly for holding a starting portion of said spring, characterized in that said apparatus further comprises a cutting unit for cutting an end portion of the wire of the made spring, said cutting unit being arranged on a side of said wire guide element opposite with respect to the spring and being adapted to cut the spring wire so as to leave, at a free end portion thereof, constituting the starting portion of a next spring, a portion having the shape of a circumference quadrant.

BRIEF DESCRIPTION OF THE DRAWINGS

Further characteristics and advantages of the present invention will become more apparent from the following detailed disclosure of a preferred, though not exclusive, embodiment thereof, which is illustrated, by way of an indicative, but not limitative, example in

the accompanying drawings, where:

Figure 1 is a schematic front view illustrating a first step for winding the spring;

Figure 2 is a top plan view illustrating a starting winding step;

Figure 3 illustrates the spring as fully wound or formed, as seen from the top;

Figure 4 is a schematic top plan view illustrating an operating step in which the wire end portion is cut-out;

Figure 5 is a front view illustrating the operating step in which the wire of the made spring is cut away; and

Figure 6 is a front view illustrating a start-inf winding step on a subsequent or next spring.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to the figures of the accompanying drawings, the apparatus for making springs without start shank, wound either rightwardly or leftwardly, according to the present invention, comprises a wire guide element, indicated generally at the reference number 1, which supplies a spring wire 2 withdrawn from a wire coil not shown in the drawings.

During the spring winding operation, generally indicated at the reference number 10, the spring wire 2 is wound on a mandrel 3, thereon operates a jaw assembly 4 adapted to hold the start end portion of the wire.

In particular, the wire is wound so as to provide the set turn number and the set pitch, which will be determined by the displacement of the wire guide element, in an axial direction, with respect to the mandrel.

As shown, the wire guide element is advantageously arranged in a horizontal plane.

After the end of the spring 10 winding operation, the wire guide element will drive the made spring 10 to a cutting unit, which is arranged, according to a main feature of the present invention, on a horizontal plane and, more specifically, being arranged on the opposite side of the wire guide element, with respect to the spring 10.

Thus, during the wire cutting step, the wire 2 being cut will be held connected to its start portion, indicated at 2A, which has the shape of a circumference quadrant, and is adapted to form the start winding portion of a next spring which can be made without shank.

The provision of the spring cutting unit 15 in a horizontal plane, allows to make springs, wound either leftwardly or rightwardly, while providing the desired start portion corresponding to a circumference quadrant on the wire 2, which thing could not be obtained by the prior art spring winding apparatus.

Moreover, the wire guide element can be vertical-

ly adjusted, so as to guide the wire both under and above the winding bar, and depending on the leftwardly or rightwardly direction of the spring being wound.

The above disclosed construction allows to make a comparatively low cost spring winding apparatus, and an apparatus which has a much smaller size than prior apparatus.

From the above disclosure it should be apparent that the present invention fully achieved the intend aim and objects.

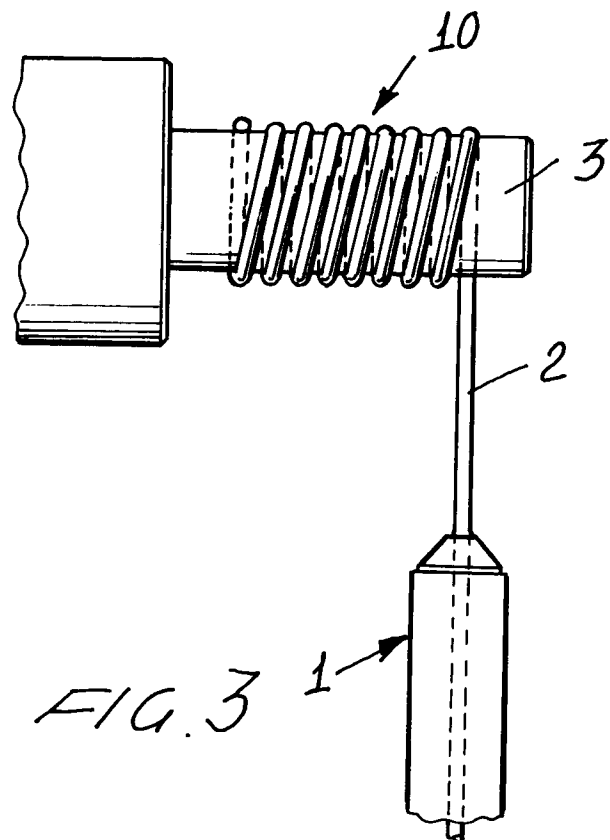
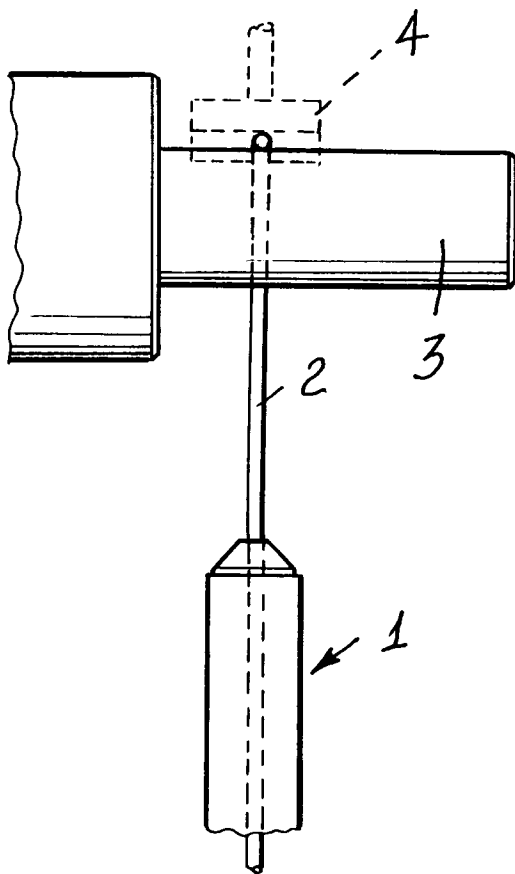
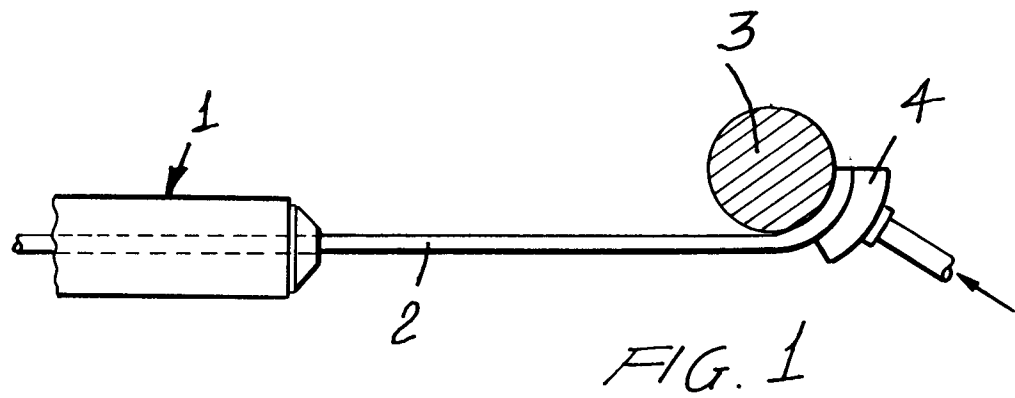
In particular, the fact is to be pointed out that a spring making apparatus has been provided which comprises a horizontal cutting unit allowing to leave a circumference quadrant start wire portion on the spring forming wire, which portion will allow to obtain a perfectly cylindrical spring.

Moreover, the provision of a horizontal cutting unit, allows the apparatus to always operate with a front wire supply and with a single wire guide element.

While the invention has been disclosed and illustrated with reference to a preferred embodiment thereof, it should be apparent that the disclosed embodiment is susceptible to several modifications and variations all of which will come within the spirit and scope of the appended claims.

Claims

1. An apparatus for making springs without starting shank, wound either rightwardly or leftwardly, said apparatus being adapted to supply the wire to be wound on a mandrel, thereon operates a jaw assembly for holding a starting portion of said spring, characterized in that said apparatus further comprises a cutting unit for cutting and end portion of the wire of the made spring, said cutting unit being arranged on a side of said wire guide element opposite with respect to the spring and being adapted to cut the spring wire so as to leave, at a free end portion thereof, constituting the starting portion of a next spring, a portion having the shape of a circumference quadrant.
2. An apparatus, according to Claim 1, characterized in that said cutting unit is arranged in a substantially horizontal plane.
3. An apparatus, according to Claims 1 and 2, characterized in that said wire guide element can be vertically adjusted in order to guide the spring wire both under and above the mandrel.
4. An apparatus, according to one or more of the preceding claims, characterized in that said cutting unit is arranged substantially opposite to the wire guide element.



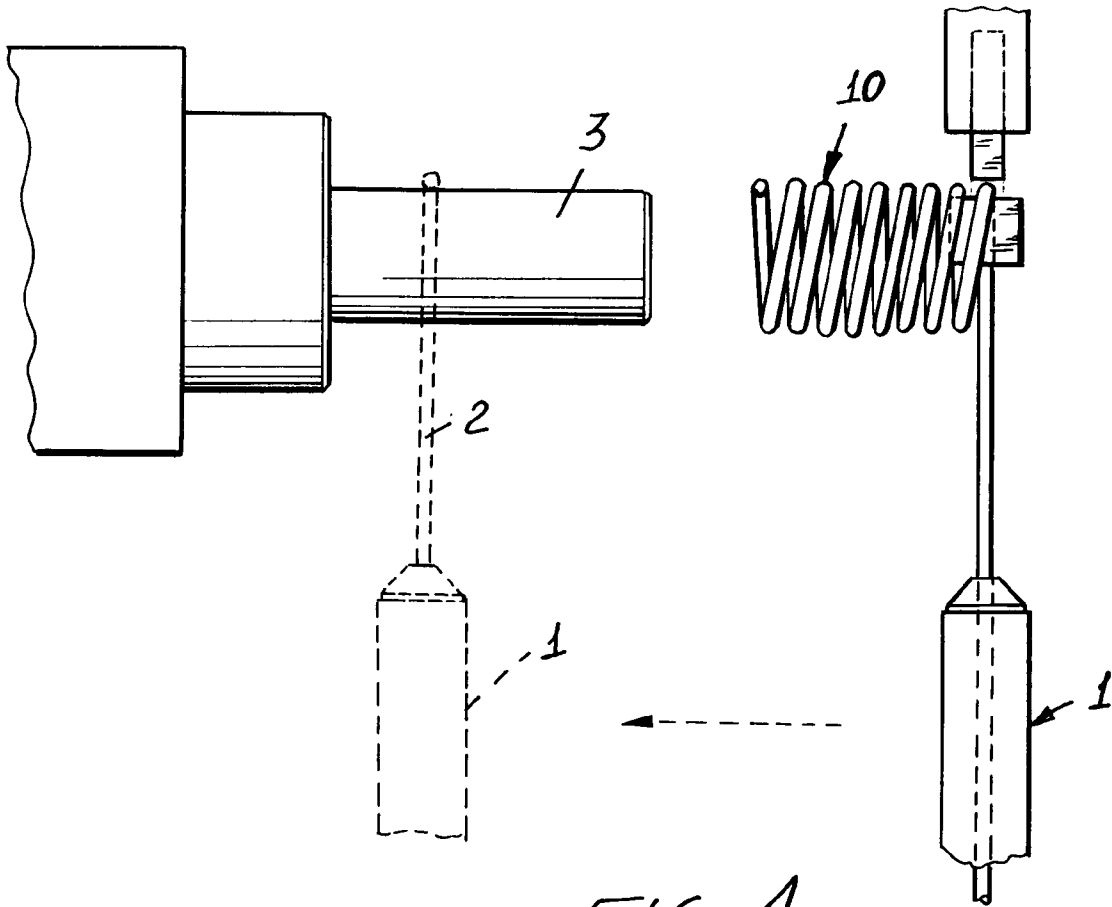


FIG. 4

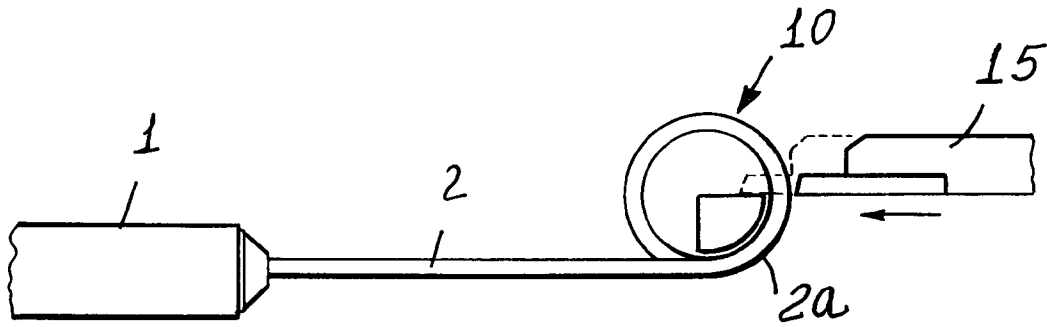


FIG. 5

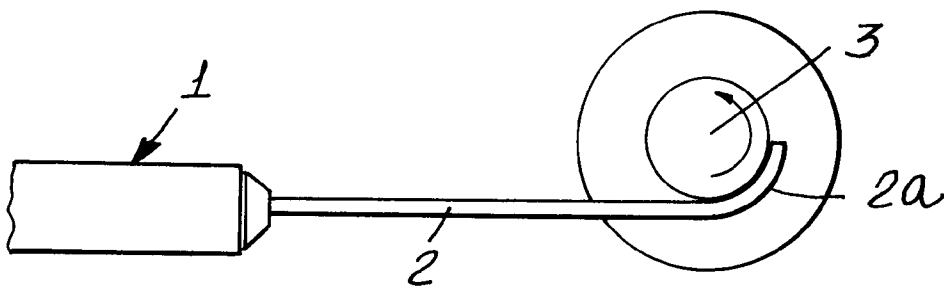


FIG. 6



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 92 83 0408

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. CL.5)
A	EP-A-0 012 104 (OEMB SA) * claim 1; figure 2 * ---	1, 2, 4	B21F11/00
A	DE-C-834 562 (EISELE) * figures * ---	1	
A	PATENT ABSTRACTS OF JAPAN vol. 11, no. 238 (M-613)(2685) 5 August 1987 & JP-A-62 50 028 (HIGH FREQUENCY HEATTREAT CO LTD) 4 March 1987 * abstract * -----	1	
			TECHNICAL FIELDS SEARCHED (Int. CL.5)
			B21F
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 22 OCTOBER 1992	Examiner BARROW J.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 (03.92) (P0401)