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1,453,431

A. A. BLOUNT

COILING MACHINE

Filed Jan. 8, 1921

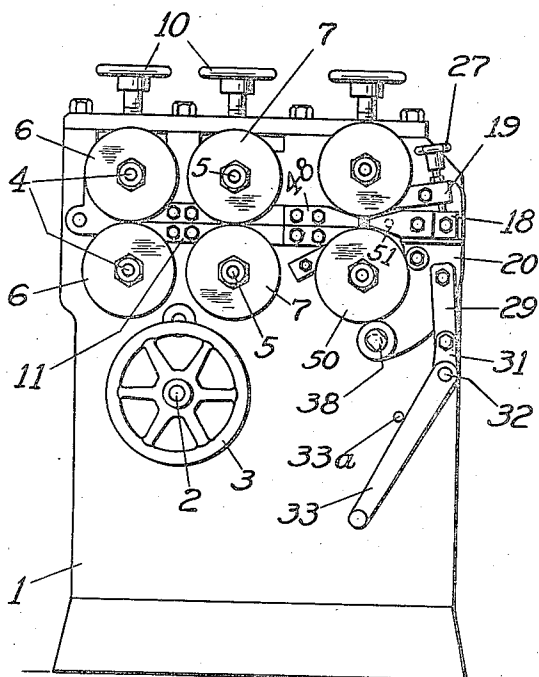


Fig. 1

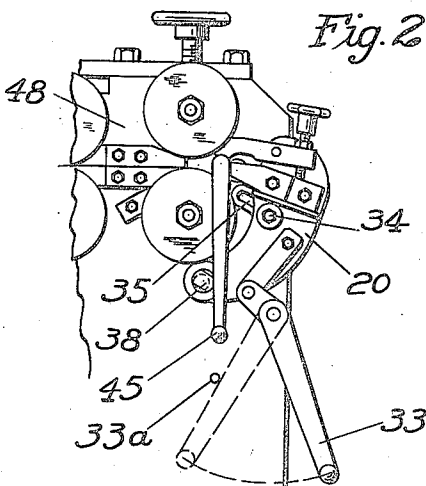


Fig. 2

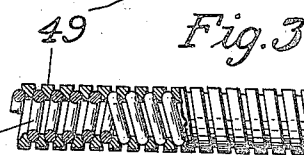


Fig. 3

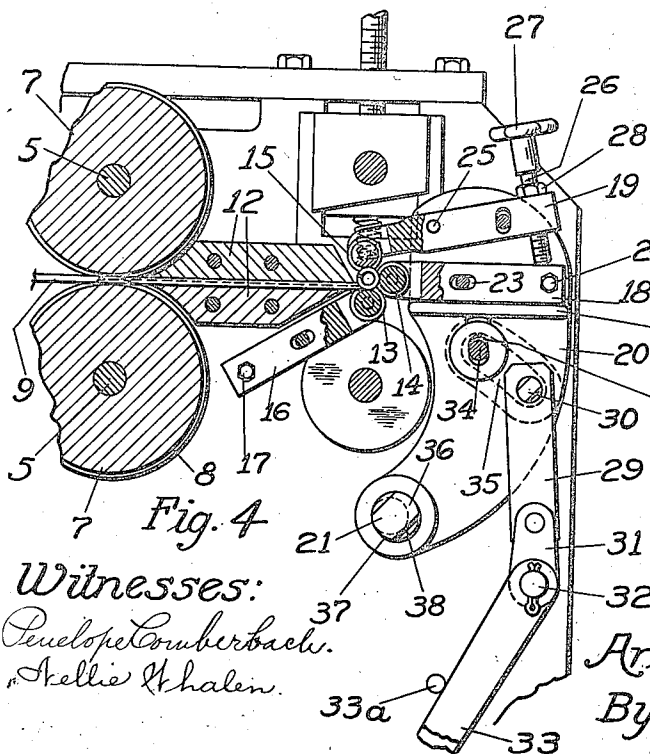


Fig. 4

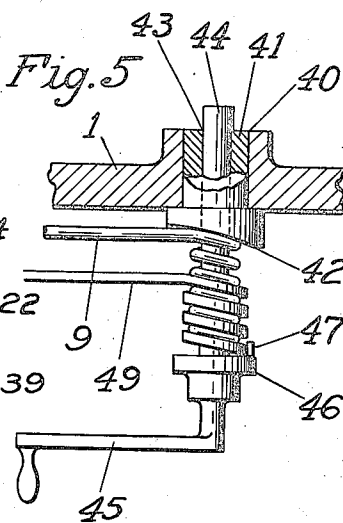


Fig. 5

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UNITED STATES PATENT OFFICE.

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COILING MACHINE.

Application filed January 8, 1921. Serial No. 435,881.

To all whom it may concern:

Be it known that I, ARLINGTON A. BLOUNT, a citizen of the United States, residing at Worcester, in the county of Worcester and Commonwealth of Massachusetts, have invented a new and useful Improvement in a Coiling Machine, of which the following, together with the accompanying drawings, is a specification.

My invention relates to coiling machines, particularly of the type which are adapted for the formation of spirally wound tubular coils of wire or similar material, such as are used as coverings for flexible shafting, electric cables and the like.

In United States Patent No. 1,319,974, issued October 27, 1919, to Frank H. Sleeper, there is shown and described a coiling machine of the above mentioned type, and the object of the present invention is to provide certain improvements in the coiling mechanism of a machine of this type, whereby it is rendered more flexible and accurate in its operation. 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 front view of a machine embodying my invention.

Fig. 2 is a fragmentary view of the machine shown in Fig. 1, with the parts of my improved coiling mechanism in a different position from that shown in Fig. 1.

Fig. 3 is a view, partly in section, of a portion of tubing which is produced by the machine.

Fig. 4 is an enlarged sectional view taken transversely near the front of the machine and showing in detail my improved coiling mechanism.

Fig. 5 is a plan view, partly in section, showing my improved device for forming the initial turns of a coil by hand preparatory to the coiling operation by the machine.

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

Referring to Fig. 1, the mechanism embodying my invention is carried on a frame-work or base 1, which supports a driving shaft 2 connected to a source of power, not shown. Suitable means are provided for controlling the connection of the shaft 2 to

the source of power and a hand wheel 3 is mounted on the shaft, by means of which it may be rotated by the operator when introducing material into the coiling mechanism to inaugurate the coiling operation, as hereinafter described.

The shaft 2 is connected to a plurality of pairs of shafts 4, 4 and 5, 5 by suitable gearing, so that the shafts 4 and 5 are driven in unison from the shaft 2, at substantially the same speeds. The shafts 4 carry cooperating feed rollers 6, 6, rotating in opposite directions, and the shafts 5 carry similar feed rollers 7, 7. The feed rollers 6 and 7 are suitably grooved, as shown at 8, Fig. 4, to receive and advance by their rotation a continuous strip 9 of material, which is subsequently coiled in spiral form. The end bearings of the upper shafts 4 and 5 are adapted to be adjusted vertically within suitable limits by means of hand screws 10, in order to vary the pressure of the feed rolls 6 and 7 on the material fed thereby. As the specific means for accomplishing this adjustment forms no part of the present invention, it will not be further described.

The strip 9 is guided in its passage between the cooperating pairs of feed rollers 6 and 7 by a channel formed between a pair of plates 11, 11, and the strip 9 is further guided in advance of the rolls 7 by a similar channel formed between a pair of plates 12, 12. The strip 9 is delivered from between the plates 12 to a coiling mechanism which consists of three grooved rollers 13, 14 and 15, arranged substantially on three sides of the space into which the strip 9 is fed, as shown in Fig. 4. The roller 13 is journaled in the forked end of a bar 16 which is secured to the wall of the frame 1 by bolts 17. In this position the groove of the roller 13 is disposed below the strip 9 as it emerges from between the plates 12, and the inclination of this roller and its groove is such as to deflect the strip laterally of the line of feed into the groove of the roller 14, the latter being slightly offset from the initial line of feed of the strip 9.

The roller 14 is journaled in the forked end of a bar 18, and the third roller 15 is similarly journaled in the forked end of a bar 19 located above the bar 18. The groove of the roller 15 is slightly offset in

advance of the groove of the roller 14, whose inclination is such as to guide the strip 9 into the groove of the roller 15 and thus impart the proper direction to the strip to form a spiral coil. The parts of the machine and coiling mechanism described thus far form no part of the present invention, and are fully shown and described in the above mentioned Patent No. 1,319,974.

In the above mentioned patented machine, the bars 18 and 19, which carry the rollers 14 and 15 respectively, are adjustably mounted on a bracket carried by the frame 1 so that the positions of the rollers may be adjusted with respect to the stationary roller 13 in accordance with the diameter desired for the coil which is formed by the cooperation of the three rollers 13, 14 and 15. The bracket which supports the bars 18 and 19 is rigid with the frame, so that it is necessary to remove the bar 18, with the roller 14, whenever it is desired to start a new coil by positioning between the rollers a number of turns or convolutions which have been previously formed by hand at a point removed from the rollers. This removal of the bar 18 necessitates its readjustment before the start of each new coil, and difficulties have been encountered in always giving the rollers the same adjustment when it is desired to successively produce coils having the same diameter.

According to the present invention, I propose to provide means whereby the rollers 14 and 15 may be moved away from the roller 13 in order to permit the positioning of previously formed convolutions, and then returned to their original position, without disturbing the relation between the rollers. I further provide means for forming the initial convolutions of the coil by hand at a point closely adjacent to the point of coiling, so that the initial convolutions can be readily positioned and the formation of a coil started as soon as the coiling rollers have been returned to their original position.

To this end the bars 18 and 19 are carried on a swinging arm 20 that is supported on the frame 1 by a pivot pin 21. The bar 18 is slidably supported on a projection 22 provided on the arm 20, and is provided with elongated slots 23 for the reception of retaining bolts 24. The roller 14 is thus horizontally adjustable toward or away from the fixed roller 13, in order to regulate the diameter of the coil which is to be formed. The bar 19 is pivotally mounted on the arm 20 by means of a pin 25, and is vertically adjustable by means of a bolt 26 passing through the outer end of the bar 19 and bearing against the bar 18. The bolt 26 is provided with a handle 27 for turning the same, and a nut 28 is provided for locking the bar 19 in position. The roller 15 may thus be raised and lowered in accordance

with the diameter desired for the coil which is to be formed by cooperation of the three rollers 13, 14 and 15.

The arm 20 is adapted to be moved about its pivot pin 21 by means of a link 29 connected at one end to the arm 20 by a pin 30, and at its other end to the short arm 31 of a bell crank lever. The lever is pivoted on the frame 1 at 32, and is provided with a handle 33 by means of which it may be operated. Pivotal movement of the arm 20 about the pin 21 in a clockwise direction is limited by means of a stud 34 operating in a slot 35 provided in the wall of the frame 1, the extreme positions of the arm 20 being shown in Fig. 2. A stop pin 33^a is located in the path of movement of handle 33 to insure that the arm 20 will always be returned to its original position.

The arm 20 is also capable of radial movement independently of its pivotal movement by means of an eccentric portion 36 provided on the pivot pin 21. The portion 36 is received in an opening 37 provided in the arm 20, and is provided with an angular portion 38 projecting beyond the arm 20 for the reception of a tool. Turning of the eccentric portion 36 causes the arm 20 to be shifted bodily about the stud 34, and provision is made for this movement by providing an elongated slot 39 in the arm 20 for the stud 34. In this way, both rollers 14 and 15 may be shifted simultaneously with respect to roller 13, to obtain small variations in the diameter of the coil.

Referring now to Figs. 2 and 5, the wall of the frame 1 is provided with an opening 40 located adjacent to the point of coiling and normally covered by the bar 18 when the machine is in operation. The opening 40 is adapted to receive a bushing 41 provided at its outer end with a scroll portion 42, having an internal opening corresponding to the form of coil which it is desired to wind. The bushing 41 is provided with a central opening 43 for receiving a coiling mandrel 44. The mandrel 44 terminates in a handle 45, and is provided with a flange 46 from which projects a coiling pin 47, the purpose of which will be hereinafter described.

Referring again to Fig. 1, a pair of guide members 48 are mounted in front of the plates 12 to provide a channel for a strip 49 of material which constitutes the outer wall of the spirally wound tube. As shown in Figs. 3 and 5, the strip 49 is substantially triangular in cross section, with the narrow portion thereof adapted to enter spaces between adjacent convolutions of the coiled inner wall of the tube. Obviously, the cross sectional shape of the strip 49 is immaterial to my invention, since the coiling mechanism is adapted for the formation of both the inner and outer walls of the tube from material of any desired cross sectional

shape. The guide members 48 lead and direct the strip 49 into close proximity to the previously coiled strip 9. A pair of coiling disks 50, driven from the shaft 2 in any suitable manner, operate to press the strip 49 firmly into the spaces between adjacent convolutions of the coil formed from the strip 9. The action of the disks 50 in guiding and pressing the strip 49 into spiral form on the rotating coil is supplemented by a coiling point 51, which prevents deflection of the strip 49 in a horizontal direction. The coiling point 51 is secured to the bar 18 by means of one of the bolts 24, which secure the bar to the arm 20. The above described means for forming the outer wall of the tube forms no part of the present invention and is fully shown and described in the previously mentioned Patent No. 1,319,974.

Having thus described the various parts of the machine entering into my invention, the operation thereof is as follows:—When it is desired to start the formation of a coil by the machine, the handle 33 is moved into the position shown in full lines in Fig. 2, thereby moving the rollers 14 and 15 away from the roller 13 and exposing the opening 40 in the wall of the base. The scroll 42 is then inserted in the opening 40 and the mandrel 44 is pushed into the bushing 41 until the pin 47 abuts the end of the scroll 42. The hand wheel 3 on the shaft 2 is then turned to advance the strip 9 to the scroll 42, where its end is inserted into the space between the pin 47 and the mandrel 44. The handle 45 is then turned, which causes the strip 9 to be bent around the mandrel and at the same time deflected by the scroll to form a spiral turn. As the first convolution is formed by the scroll 42, the mandrel is forced outwardly and this movement continues as successive convolutions are formed by the turning of the handle 45. After several complete convolutions have been formed, the strip 49 is introduced between the pin 47 and the coil formed by the strip 9, so that continued turning of the handle 33 will cause the strip 49 to be wound upon the convolutions of the strip 9, as shown in Fig. 5.

When a short length of tubing has been thus formed, the mandrel 44 is withdrawn from the scroll 42, and the coil is then moved into position over the stationary roller 13 by turning the hand wheel 3. The handle 33 is then moved to the left, as shown in Fig. 1, thereby bringing the rollers 14 and 15 into their coiling position. The bars 18 and 19 are then adjusted upon the arm 20 to bring the rollers 14 and 15 into the proper position to form a coil of the desired diameter. The position of the coiling point 51 is also adjusted at the same time. After the rollers 14 and 15 have been properly ad-

justed, the machine may be connected to the source of power and will produce tubing of the form shown in Fig. 3.

When the supply of strip material has been exhausted and it is necessary to start a new coil following a replenishment of the strip material, the handle 33 is moved to the right to move the rollers 14 and 15 bodily away from the coiling space. The mandrel 44 is again inserted and a new coil started, as previously described. The rollers 14 and 15 may then be returned to their original position and the formation of the same sized tubing continued, without further adjustment of the rollers 14 and 15, for it is obvious that the rollers 14 and 15 will occupy the same relative positions as during the previous coiling operation.

When it is desired to produce tubing having a slightly greater or less diameter than that which has previously been formed, it is only necessary to turn the angular portion 38 of the pin 21. This causes the arm 20 to move radially about the stud 34 and thus shift the rollers 14 and 15 simultaneously with respect to roller 13, the rollers 14 and 15 being moved toward or away from the roller 13 to change the diameter of the tubing, as desired. The rollers will keep this new adjustment when the arm 20 is withdrawn, as previously set forth.

From the foregoing it is apparent that I have provided an improved coiling mechanism by means of which it is possible to readily form by hand the several convolutions necessary to initiate the formation of a coil by the machine. Furthermore, when the coiling rollers have once been adjusted to produce tubing of a given form, it is possible, by my invention, to continuously produce tubing of this form without further adjustment of the coiling rollers, even though it is necessary to start a new coil several times following replenishment of the strip material. The fact that the coiling rollers 14 and 15 are capable of simultaneous adjustment with respect to roller 13, in addition to the individual adjustment by the bars 18 and 19, renders the machine extremely flexible in its operation, and permits the formation of tubing varying very slightly in diameter.

While I have shown my invention embodied in a coiling machine of a particular type, it is not so limited, for it is obvious that the principle involved therein may be employed in any coiling machine using a number of rollers or other suitable devices to coil a strip in spiral form. Nor is my invention limited to a machine adapted for the formation of double wall tubing, for it is obvious that the disks 50 and coiling point 51 may be omitted from the machine and single wall tubing formed by the cooperating rolls 13, 14 and 15. I desire, therefore,

that only such limitations be imposed thereon as come within the scope of the appended claims.

I claim,

5 1. In a machine of the class described, the combination with means for feeding material to be coiled and a plurality of devices arranged with a predetermined relation about a space into which the material is fed
10 for forming the material into a coil, of means for rendering said devices operative or inoperative, at will, without affecting the relation between said devices.

2. In a machine of the class described,
15 the combination with means for feeding the material to be coiled and a plurality of rollers arranged on different sides of a space into which the material is fed, the said rollers being adjustable with respect to each
20 other to determine the size of the coil into which the material is formed, of means for rendering said rollers operative or inoperative, at will, without altering the adjustment of said rollers.

3. In a machine of the class described, the combination with means for feeding material to be coiled and a plurality of devices arranged on different sides of a space into which the material is fed, of means for moving
30 said devices bodily with respect to the space without altering the arrangement thereof.

4. In a machine of the class described, a pivotally mounted arm a coiling mechanism
35 comprising a plurality of devices supported on said pivotally mounted arm and means for shifting the pivotal axis of said arm.

5. In a machine of the class described, a pivotally mounted arm a coiling mechanism
40 comprising a plurality of rollers supported on said pivotally mounted arm, each of said rollers being independently adjustable on said arm and means for shifting the pivotal axis of said arm.

6. In a machine of the class described, a

pivotally mounted arm a coiling mechanism comprising a plurality of devices supported on said pivotally mounted arm, and means for moving said arm concentrically on its pivot.

7. In a machine of the class described, a pivotally mounted arm a coiling mechanism comprising a plurality of rollers supported on said pivotally mounted arm, each of said rollers being independently adjustable on
55 said arm, and said arm being movable eccentrically on its pivot.

8. In a machine of the class described, the combination with means for feeding material to be coiled and a plurality of devices
60 adapted by their arrangement to form the material into a coil of a predetermined diameter, of means for simultaneously shifting certain of said devices to vary the diameter of the coil which is formed.

9. In a machine of the class described, the combination with means for feeding material to be coiled and a plurality of rollers adapted by their arrangement on different
70 sides of the space into which the material is fed to form the material into a coil of a predetermined diameter, one of said rollers being fixed in position, of means for simultaneously shifting the position of the other rollers with respect to the fixed roller to vary
75 the diameter of the coil which is formed.

10. In a machine of the class described, the combination with means for feeding material to be coiled and a plurality of rollers arranged on different sides of a space into
80 which the material is fed, the said rollers being adjustable with respect to each other to determine the size of the coil into which the material is formed, of means for simultaneously shifting certain of said rollers to
85 vary the diameter of the coil which is formed without disturbing the previous adjustment of the rollers.

Dated this 31st day of December, 1920.

ARLINGTON A. BLOUNT.