W. J. PINE.

COILER MAKING MACHINE.

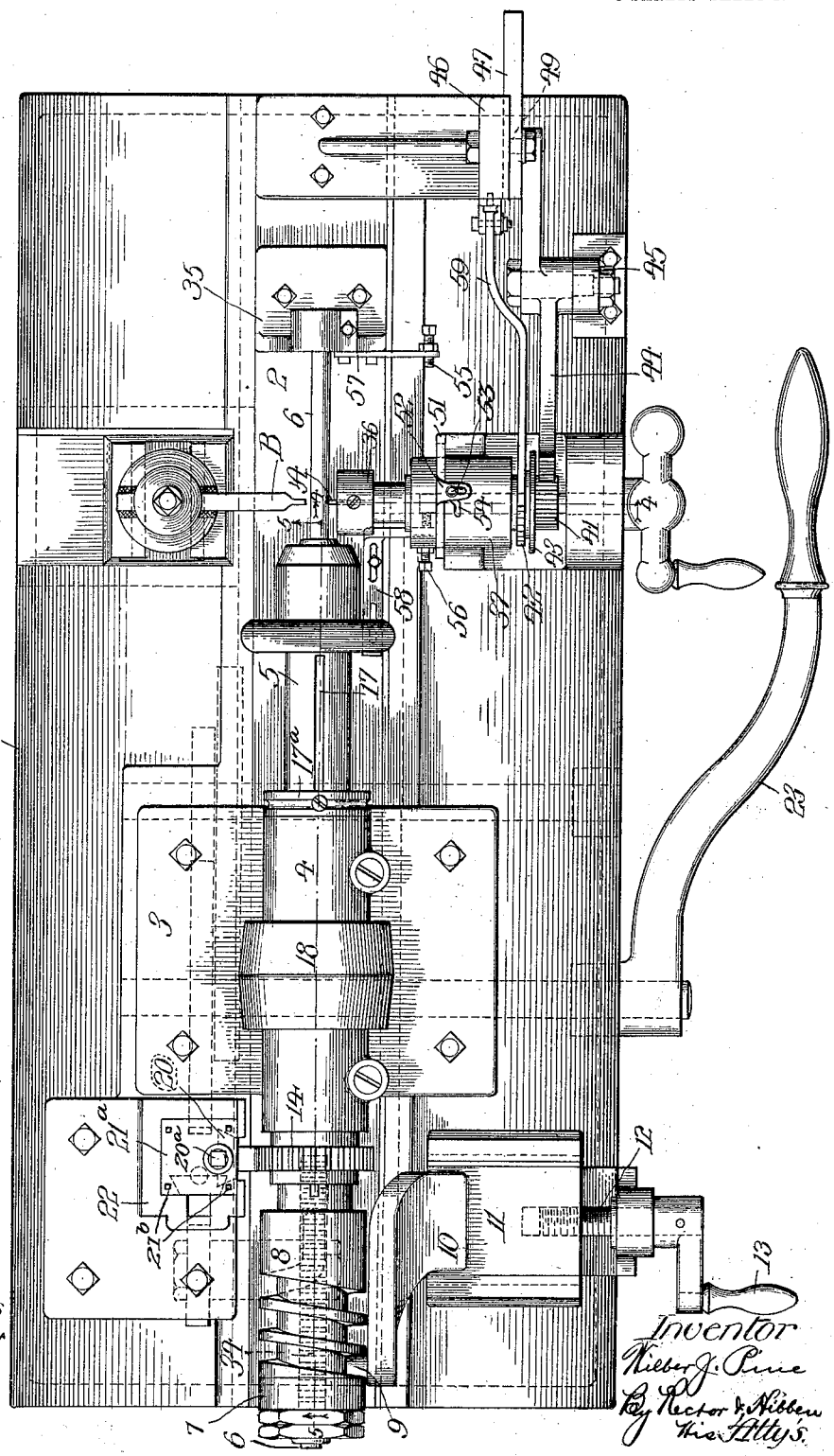
APPLICATION FILED OCT. 31, 1905.

1,047,285.

Patented Dec. 17, 1912.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses
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Louis B. Ewin

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3 SHEETS—SHEET 2.

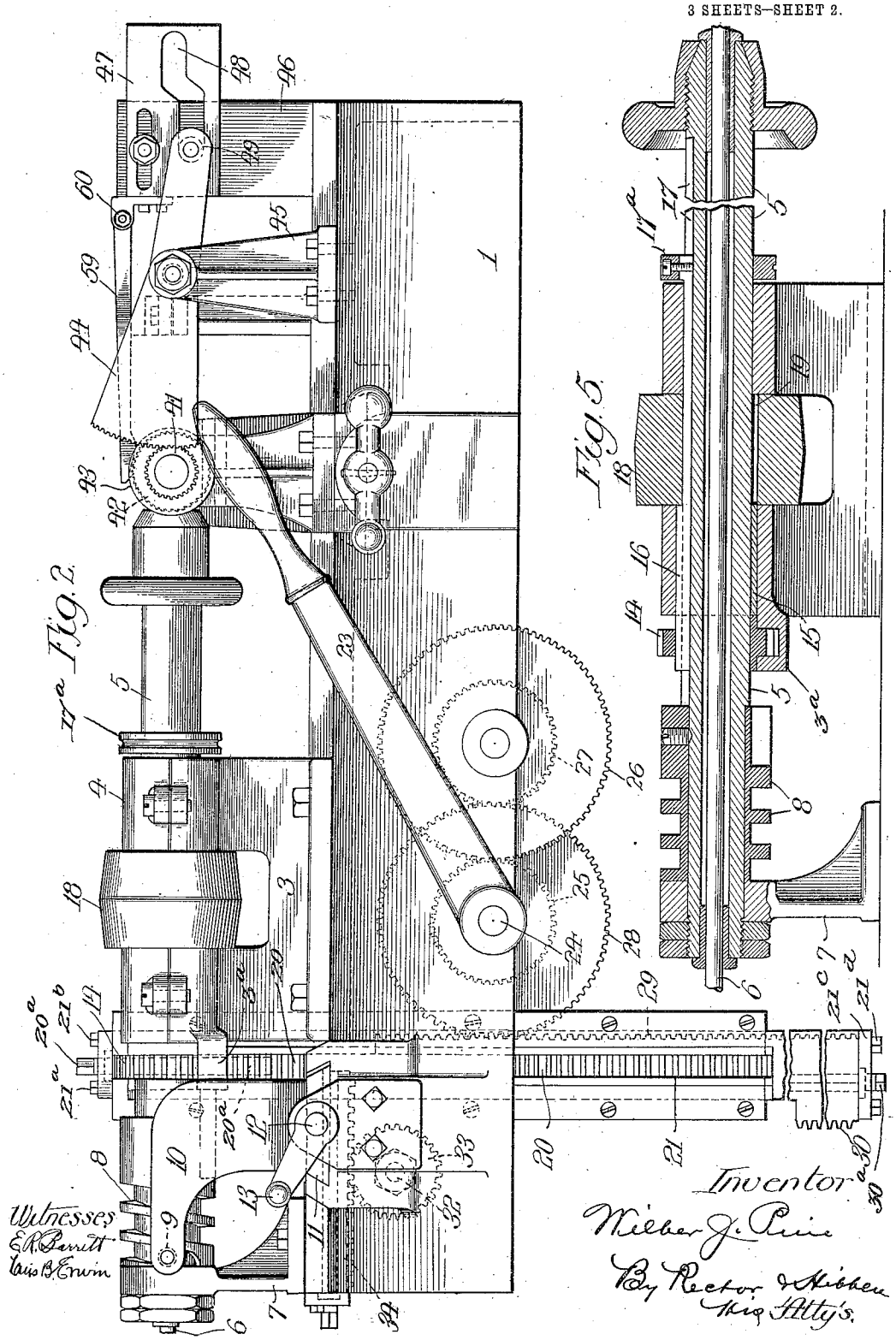

Fig. 2.

Fig. 5.

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3 SHEETS—SHEET 3.

Fig. 3.

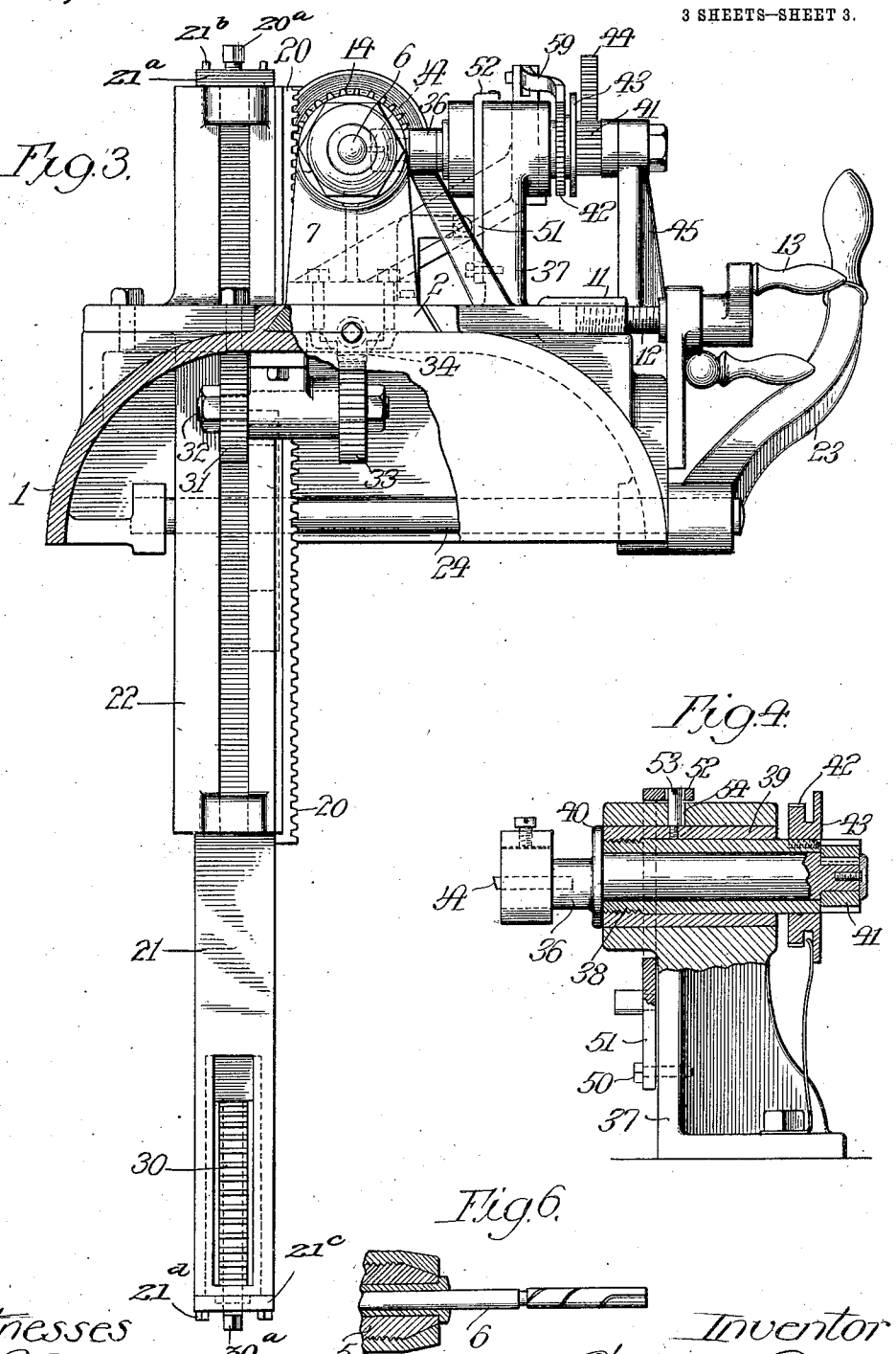

Fig. 4.

Fig. 6.

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UNITED STATES PATENT OFFICE.

WILBER J. PINE, OF OSHKOSH, WISCONSIN, ASSIGNOR TO PINE-IHRIG MACHINE COMPANY, OF OSHKOSH, WISCONSIN, A CORPORATION OF WISCONSIN.

COILER-MAKING MACHINE.

1,047,285. Specification of Letters Patent. Patented Dec. 17, 1912.

Application filed October 31, 1905. Serial No. 285,311.

To all whom it may concern:

Be it known that I, WILBER J. PINE, a citizen of the United States, residing at Oshkosh, in the county of Winnebago and State of Wisconsin, have invented a new and useful Coiler-Making Machine, of which the following is a specification.

My invention relates to a machine for making coilers which are used in coiled-wire fabric machines, and the object thereof is to produce a machine capable of making coilers which shall not only be uniform, but shall also be absolutely accurate for the purpose of properly coiling wire.

One of the principal difficulties attending the use of coiled-wire fabric machines arises from the fact that the coilers employed lack uniformity and moreover are not perfect or accurate in the grooves or cuts through which the wire passes in the formation or production of the coil, with the result that the coils of the wire fabric likewise lack uniformity and perfection, besides which the coilers soon become worn out and useless because of the friction between the wire and the groove due to the imperfections or inaccuracies in the path formed by such groove.

For the purpose of making absolutely perfect and accurate coilers, perfect duplicates of one another, I have designed a special machine forming the subject matter of this invention, by the use of which machine any number of exactly similar coilers may be produced with an accurate groove according to a predetermined form or templet.

In the drawings, Figure 1 is a plan view of my coiler making machine; Fig. 2 a side elevation thereof; Fig. 3 an end elevation partly broken away; Fig. 4 a section on the line 4—4 of Fig. 1; Fig. 5 a longitudinal section of the arbor and associated parts taken on line 5—5 of Fig. 1; and Fig. 6 a detail view of the inner end of the arbor and illustrating a completed coiler just before being cut off from the blank stock.

Referring to the present embodiment of my invention as herein shown, the machine is provided with a main frame or bed plate 1, which may be supported in any suitable manner and which is arranged to carry or support the working parts of the machine. These working parts are mounted on a slide or base plate 2 adapted to slide longitudinally of the machine in suitable grooves in the main frame thereof, as indicated in Figs. 1 and 3. Rising from the main frame is a stationary support or bracket 3 provided with bearings 4, in which are journaled the rotatable and also longitudinally movable arbor or shaft 5. This arbor is hollow so as to receive the rod or blank stock 6, from which the coilers are to be formed. The outer end of the arbor 5 is supported in a longitudinally movable frame 7, which is secured in suitable manner to the slide 2, with the result that as the slide moves the frame 7 and its arbor 5 are correspondingly moved, such movement being longitudinally of the machine. The arbor carries toward its outer end the templet 8 which as shown has a spiral groove terminating or running into a straight or longitudinal groove as is required in coilers for the purposes already explained, such templet representing an exact counterpart of the character of groove to be cut in the blank stock in the manner hereinafter explained.

It will be understood that the arbor 5, together with its rod or blank stock 6 must be rotated for the formation of the spiral cut and have a simultaneous longitudinal movement and must have a longitudinal movement only at the time when the longitudinal groove for the coiler is to be formed. The means for so operating the arbor will now be described.

For the purpose of moving the arbor and the blank stock longitudinally simultaneously with the rotation of the arbor and for so moving the arbor longitudinally in degree as determined by the templet, I provide a stud or roller 9 having a fixed position with relation to the longitudinal axis of the machine and adapted to be received both by the spiral and the straight portion of the groove in the templet. This roller is mounted or supported in suitable manner but in the present instance the same is carried at the inner end of a bracket plate 10, adjustable transversely of the machine, as hereinafter described. When the roller occupies its position at the outer end of the spiral groove, as seen in Fig. 2. the arbor is in the proper position for the beginning of the cut on the blank stock. whereas when the roller reaches the end of the straight cut. the end of the cut on the blank stock has been reached. Suitable arrangement is made for withdrawing the roller 10 from

the templet and in the present instance such arrangement consists of a slide 11, on which the plate 10 is mounted, and which is arranged to be adjusted transversely of the machine by means of the screw 12, provided at its outer end with the handle 13.

Referring next to the means for rotating the arbor in the operation of forming or cutting the blank stock to produce the coilers, I mount upon the arbor 5 a gear 14 having a spline or key connection therewith. As clearly shown in Fig. 5, this gear is restrained against longitudinal movement of the machine by means of an extension 3ª on the bracket 3, which extension partially envelops the gear and thus prevents longitudinal movement thereof. Within the hub portion of the bracket 3 and surrounding the arbor is a sleeve or bushing 15 having a longitudinal slot to receive the spline or key 16. This key is of peculiar formation, in that it is reduced in thickness toward its inner end, leaving its outer end, that is the end toward the left in Fig. 5 of the full height, so that its upper edge is flush with the outer surface of the bushing 15. This key, which is arranged to slide longitudinally in the key-way or seat 17 of the arbor, is adapted to enter at its outer end the gear 14 at which time such gear is operatively connected with the arbor to thereby rotate the latter whenever the gear is rotated in the manner hereinafter explained. At its inner end, which extends beyond the inner face of the bracket 3 the key is secured to a suitable operating device, such as a collar 17ª, whereby the key may be manually manipulated whenever it is desired to disconnect the gear from the arbor and to connect such arbor with a pulley 18. When the key is thus shifted longitudinally and inwardly the inner or enlarged end of the key is arranged to be received in a key-way or seat 19 in such pulley, with the result that upon disengagement of the key from the gear 14 operative engagement between the arbor and the pulley 18 is brought about. This engagement of the pulley with the arbor takes place after the coiler has been completely formed and when it is desired to cut off the coiler from the blank stock in a manner hereinafter explained when the tool for cutting the groove in the coiler is described.

To rotate the gear 14 at the proper time and to the required degree, I provide a rack 20 which may constitute an integral part of a vertically movable bar 21, but which, in the present instance, is formed separate therefrom for the purpose of providing for relative adjustment in the manner hereinafter explained. This bar which is rectangular in cross section in the present instance, as seen in Fig. 1, is arranged to slide up and down in a guide 22 secured in suitable manner to the machine frame. The means for moving or reciprocating the bar 21 vertically comprises a handle 23 arranged at one side of the machine and secured to a transverse shaft 24 which is in turn operatively connected through the series or train of gears 25, 26, 27 and 28 with such bar 21, such bar having a rack 29 which is adapted to engage with the last gear 28 of the train. It will now be understood that when the handle 23 is operated by depressing the same from its normal position indicated in Fig. 2, the bar 21 will be elevated with the result that its rack 20 which is in mesh with the gear or pinion 14 will cause the latter, together with its arbor 5, to rotate so long as the gear 14 and the rack 20 are in mesh. When, however, the rack 20 passes upwardly beyond the range of the gear 14 and at the very moment of disengagement a second rack 30 at the lower end of the bar 21 will be brought into mesh with pinion 31, (Fig. 3) to thereby move the arbor and templet longitudinally outwardly without any rotary movement of the arbor. This is accomplished by means of operating connections between the lower rack 30 and the sliding frame. As herein shown, the rack 30 which may be made separate from the bar 21 so as to be adjustable relatively thereof is arranged to mesh with a pinion 31 whenever the bar 21 is elevated sufficiently to present such rack 30 thereto. This pinion is secured to one end of a transverse shaft or spindle 32, to whose other end is secured a pinion 33 arranged to mesh with a rack 34 on the underside of the slide frame. It is now obvious that after the rack 20 has passed beyond the range of the gear 14 the rack 30 becomes engaged with the pinion 31, whereupon the sole movement of the arbor 5 is a longitudinal one and the junction between the straight cut and the spiral cut is formed with absolute accuracy, just as it is formed in the templet 8.

As above stated, the racks 20 and 30 are made separate from the bar 21 and are adjustable relatively thereof. Referring first to the adjustability of the rack 20, the bar 21 is provided with a top cap 21ª which is secured to the bar in suitable manner, as by means of the screw bolts 21ᵇ, and through which passes the adjusting screw 20ª, engaging the rack 20, with the result that, as the screw is rotated in one direction or the other the rack 20 is moved and adjusted accordingly. In like manner the lower end of the bar is provided with a bottom cap or plate 21ᶜ which is secured thereto in suitable manner, as by means of the bolts 21ᵈ, and through which passes the adjusting screw 30ª, engaging the rack 30, with the result that, as such screw is turned in one direction or the other the rack is correspondingly moved or adjusted.

It will be understood that the blank stock 6 is held at its outer end in suitable manner,

as by means of a chuck 35 and that such blank is operated upon at a point between the end of the arbor and such chuck, as illustrated in Fig. 1. The tool marked A is carried in a suitable tool-holder 36 mounted in the hub of a post 37, which is stationary so far as movement longitudinally of the machine is concerned, the work in blank being the element movable in such direction. The tool-holder is arranged to rotate within an inner sleeve or bushing 38 which is itself contained within an outer bushing 39 having screw-threaded connection therewith at its inner end, as clearly indicated in Fig. 4. The tool-holder is restrained against longitudinal movement with respect to its sleeve 38 by means of the circular flange 40 and also by the pinion 41 secured on the outer reduced end of such tool-holder. Upon the inner sleeve 38 is mounted a ratchet wheel 42 and also a hand-wheel 43 for the purpose hereinafter explained.

For the purpose of rotating the tool-holder in automatic manner, I provide a segmental gear 44 pivoted intermediate its length upon a support or bracket 45 rising from the main frame of the machine, which gear meshes with the gear or pinion 41 and is automatically oscillated in the sliding movements of the main slide which carries the templet. To this end, said slide is provided with an upwardly extending bracket 46 on which is adjustably mounted a cam plate 47 having an irregular or cam slot 48, which is arranged to coöperate with a stud or roller 49 projecting laterally from the free and extended end of the segmental gear 44. It will be understood that when the main slide moves rearwardly, that is to the left in Fig. 2 in the operation of producing a coiler, the cam plate 47 is correspondingly moved to the left, with the result that the segmental gear would be rocked downwardly and the pinion 41 correspondingly rotated, so that the face of the tool will always be presented squarely to the cut at all times.

For the purpose of withdrawing the tool from the work after it has reached the end of its cut and for advancing such tool to the work after the templet and associated parts, together with the blank stock have been retracted for the next operation or cut, I provide the following mechanism. Upon a stud or bolt 50 on one side of the tool post I pivot the lower end of a yoke 51 which encircles the hub portion of the post 37 and is provided at its upper end with an outwardly projecting lug 52, which receives through a transverse slot a pin or stud 53, as clearly shown in Figs. 1 and 4. This stud screws into the upper face of the outer sleeve or bushing 39 and passes through an angular slot 54 in the hub of the tool post. This yoke is adapted to be automatically operated or shifted at opposite ends of the stroke of the main slide of the machine and in the present instance such means comprises adjustable bolts or screws 55 and 56, mounted in suitable manner upon said main slide frame and interposed in the path of movement of the yoke portion 51 above its povotal point. The arrangements of the parts and the angular formation of the slot 54 are such that when the yoke 51 is contacted by the screw or bolt 55 at the end of the outward or rearward stroke of the main slide frame, the outer sleeve 39 and the inner sleeve 38 will be shifted outwardly, together with the tool-holder and tool, so that the tool will be removed from the work at the time when the templet and associated parts are moved back to normal or starting position. When the templet and main slide frame are thus restored to starting position and at the end of said movement the other screw or bolt 56 will contact the projection on yoke 51 and will shift the outer sleeve 39 in a direction the reverse of that caused by the screw 55 with the result that the tool will be advanced to the work. By preference and in the present instance, the screw or bolt 55 is carried at the outer end of a plate or bar 57 secured to the chuck 35 and traveling therewith. The other screw or bolt 56 is carried upon a plate 58 which is adjustable upon the main slide frame.

It will be understood that the cut in the blank stock or coiler is not made at one time but that a series of cuts are made until the required depth is obtained. For obtaining in automatic manner the proper feed of the tool for the successive cuts I provide suitable mechanism which, in the present instance, consists of a ratchet feed between the slide frame and the inner sleeve 38. As hereinbefore stated, this latter sleeve is provided with a ratchet wheel 42 and to impart to the same the intermittent and step by step feed, I provide a pivoted pawl 59 pivoted at one end at 60 to the bracket 46 and having its other end made hook-shaped or provided with a ratchet tooth to coöperate with the ratchet teeth on the wheel 42. When the slide frame moves outwardly, that is to the left in Fig. 2, the pawl 59 rides freely upon the teeth of the ratchet wheel 42, but upon the reverse movement of the slide frame such pawl engages a tooth on the ratchet wheel and causes a rotation of the inner sleeve 38 and a consequent inward feeding of the tool to the extent represented by a one-tooth movement of the ratchet wheel. This inward feeding of the tool to the work is intermittent with every stroke or movement of the main slide frame and such feeding continues until the proper or required depth of cut is reached.

After the groove has been formed in the blank stock, a cut-off tool marked B of

usual and well known construction is advanced to operative position and at the same time the key 16 is moved inwardly to withdraw the same from engagement with the gear 14 and to bring it into coöperative relationship with the pulley 18, whereupon the arbor is rotated by means of the pulley and the completed coiler cut off from the blank stock.

Describing one complete movement or cycle of movement of the operating parts and assuming that the parts are in the relative position indicated in the drawings, the tool is presented to the work or blank stock ready to begin the spiral cut and the gear 14 is operatively connected with the arbor by means of the key, while such arbor is disconnected from the pulley 18. At this time also the roller 9 occupies its position at the outer end of the spiral cut or groove in the templet. When the operator depresses the handle 23 the movement is transmitted through the train of gearing to the vertical rack 20, thereby causing the vertical bar 21 to be elevated and the gear 14 to be rotated. This rotation of the gear or pinion 14 provides for the desired or necessary rotary movement of the arbor and of the blank stock, while the required longitudinal movement in the degree necessary for the proper formation of the groove is afforded by the templet which, by reason of its engagement or coöperation with the roller 9 withdraws the entire arbor and blank stock outwardly as permitted by the groove in the templet. At the moment when the roller 9 reaches the junction between the spiral portion and the straight portion of the groove, or rather when such portion is presented to the roller, the rack 20 has just passed beyond the range of the gear 14 and the rack 30 has now become engaged with the pinion 31 and the pinion 33 thereby rotated to cause a longitudinal movement of the main slide frame through the medium of the rack 34. The arbor and associated parts, together with the blank stock are now moved outwardly but without any rotary movement, inasmuch as the straight cut or groove in the coiler is being formed. In this manner and by these means the coilers are not only produced as exact counterparts of the templet, but the groove on the coiler is formed with absolute accuracy, especially at the junction between the spiral and the straight portion of the groove or cut. It will be understood that during the operation just described, the tool is automatically withdrawn from the work when the end of the cut is reached, so as to be free from the work when the arbor is restored to its normal or starting position, whereupon in automatic manner the tool is advanced to the work and at the same time, by reason of the ratchet feed, the tool is advanced slightly inwardly to make the next and deeper cut. When the groove or cut has been formed on the coiler to the sufficient depth, the operator withdraws roller 9 from engagement with templet and manually shifts the key 16 inwardly, withdrawing the latter from the gear or pinion 14 and causing it to engage with the pulley 18, whereupon operative connection is established between such pulley and the arbor for the rotation of the latter in the operation of cutting off the coiler from the blank stock.

I claim:

1. A coiler making machine comprising, in combination with the cutting tool and the arbor for holding the blank stock, means for simultaneously rotating and moving the arbor longitudinally and also for moving the arbor longitudinally without rotation, such operations being continuous to produce a coiler having a spiral and a straight or longitudinal cut, and a templet having a continuous spiral and a longitudinal cut corresponding with the coiler to be produced, said templet controlling the combined rotary and longitudinal movements of the arbor for the production of the spiral cut and the longitudinal movement alone for the production of the longitudinal cut.

2. A coiler making machine comprising, in combination with the cutting tool and with the arbor adapted to hold the blank stock and arranged for combined rotary and longitudinal movement and also for longitudinal movement alone, means for so operating the arbor, and a templet arranged in axial alinement with the arbor and having a continuous spiral and longitudinal cut corresponding with the coiler to be produced, said templet controlling the combined rotary and longitudinal movements of the arbor for the production of the spiral cut and the longitudinal movement alone for the production of the longitudinal cut.

3. A coiler making machine, comprising in combination with the tool and arbor for holding the blank stock, a templet in the form of a cylinder with both a spiral and a longitudinal groove corresponding with the cuts to be made on the coiler, said templet being mounted upon the arbor and controlling the combined rotary and longitudinal movements of the arbor and also the separate longitudinal movement thereof.

4. A coiler making machine, comprising, in combination with the tool and arbor for holding the blank stock, a templet in the form of a cylinder with both a spiral and a longitudinal groove corresponding with the cuts to be made on the coiler, said templet being mounted upon the arbor, and a stationary roller received by the groove in the templet for controlling the combined rotary and longitudinal movements of the arbor and also the separate longitudinal movement thereof.

5. A coiler making machine, comprising, in combination with the tool and arbor for holding the blank stock, a templet in the form of a cylinder with both a spiral and a longitudinal groove corresponding with the cuts to be made on the coiler, said templet being arranged concentric of the arbor and secured thereto, a longitudinally movable support for the arbor, and a stationary roller coöperating with the groove in the templet which controls the rotary and longitudinal movements of the arbor.

6. A coiler making machine comprising, in combination with the tool and arbor for holding the blank stock, a templet in the form of a cylinder with both a spiral and a longitudinal groove corresponding with the cuts to be made on the coiler, said arbor being hollow to contain the stock and the templet, being arranged concentric of the arbor and secured thereto, a longitudinally movable support for the arbor, and a stationary roller coöperating with the groove in the templet which controls the rotary and longitudinal movements of the arbor.

7. A coiler making machine comprising, in combination with the tool and arbor for holding the blank stock, a templet in the form of a cylinder with both a spiral and a longitudinal groove corresponding with the cuts to be made on the coiler, said templet being arranged concentric of the arbor and secured thereto, and a longitudinally movable support for the arbor, the templet governing the longitudinal movement of the arbor during the formation of the spiral cut on the coiler, and separate means controlled by the templet for moving the arbor longitudinally for producing the longitudinal cut on the coiler.

8. A coiler making machine comprising, in combination with the tool and the arbor for holding the blank stock, a templet arranged concentric of the arbor for governing the longitudinal movement of the arbor during the formation of the spiral cut and also the straight cut on the coiler and separate means for moving the arbor longitudinally for producing the longitudinal cut on the coiler, said means being inoperative during the formation of the spiral cut on the coiler but rendered operative upon the completion of such particular cut, said templet controlling the cutting of the stock independently of the speed of the machine.

9. A coiler making machine comprising, in combination with the tool and the arbor for holding the blank stock, a templet arranged concentric of the arbor for governing the longitudinal movement of the arbor during the formation of the spiral cut and also the straight cut on the coiler, a gear on said arbor, and a movable bar having a rack for operating said gear to rotate the arbor, said templet controlling the cutting of the stock independently of the speed of the machine.

10. A coiler making machine comprising, in combination with the tool and the arbor for holding the blank stock, a templet governing the longitudinal movement of the arbor during the formation of the spiral cut and also the straight cut on the coiler, a gear on said arbor, a sliding frame supporting the arbor and having a rack, and a movable bar having racks coöperating with said gear and operatively connected with said rack for rotating the arbor and moving the same longitudinally.

11. A coiler making machine comprising, in combination with the tool and the arbor for holding the blank stock, a templet governing the longitudinal movement of the arbor during the formation of the spiral cut and also the straight cut on the coiler, a gear on said arbor, a sliding frame supporting the arbor and having an adjustable rack, a pinion engaging said rack, and a movable bar having racks coöperating with said gear and pinion respectively.

12. A coiler making machine comprising, in combination with the tool and the arbor for holding the blank stock, a templet governing the longitudinal movement of the arbor during the formation of the spiral cut and also the straight cut on the coiler, a gear on said arbor, a sliding frame supporting the arbor, means for actuating the frame, and a movable bar having an adjustable rack coöperating with said gear.

13. A coiler making machine comprising, in combination with the tool and the arbor for holding the blank stock, a templet governing the longitudinal movement of the arbor during the formation of the spiral cut and also the straight cut on the coiler, a gear on said arbor, a sliding frame supporting the arbor, a rack on said frame, a pinion engaging said rack, and a movable bar having two adjustable racks coöperating with said gear and pinion respectively.

14. A coiler making machine comprising, in combination with the tool and the arbor for holding the blank stock, a templet governing the longitudinal movement of the arbor during the formation of the spiral cut on the coiler, a gear on said arbor, a sliding frame supporting the arbor and having a rack, a pinion engaging said rack, and a movable bar having racks at different points along its length to successively engage said gear and pinion.

15. A coiler making machine comprising, in combination with the tool and the arbor for holding the blank stock, a templet governing the longitudinal movement of the arbor during the formation of the spiral cut on the coiler, a gear on said arbor, a sliding frame supporting the arbor and having a rack, a pinion engaging said rack, and

a movable bar having racks at different points along its length to successively engage said gear and pinion, said bar having operating means consisting of an operating rack on the bar and a train of gear cooperating with such last named rack.

16. A coiler making machine comprising, in combination with the tool and the arbor for holding the blank stock, a templet governing the longitudinal movement of the arbor during the formation of the spiral cut on the coiler, a gear on said arbor, a sliding frame supporting the arbor and having a rack, a driving pinion for such rack, and means for rotating said gear and shifting said frame longitudinally after the rotary movement of the arbor has ceased, said gear being keyed on the arbor.

17. A coiler making machine comprising, in combination with the tool and the arbor for holding the blank stock, a templet governing the longitudinal movement of the arbor during the formation of the spiral cut on the coiler, a gear on said arbor, a sliding frame supporting the arbor and having a rack, a driving pinion for such rack, a stationary bracket by which the gear is held against longitudinal movement, said gear being keyed on the arbor, and means for rotating said gear and shifting said frame longitudinally after the rotary movement of the arbor has ceased.

18. A coiler making machine comprising, in combination with the tool and the arbor for holding the blank stock, a templet governing the longitudinal movement of the arbor during the formation of the spiral cut and the straight cut on the coiler, a gear on said arbor, a sliding frame supporting the arbor, means for rotating said gear and shifting said frame longitudinally after the rotary movement of the arbor has ceased, a pulley on the arbor, and a shiftable key for establishing operative connection between the arbor and the gear at one time and the arbor and the pulley at another time.

19. A coiler making machine comprising, in combination with the tool and the arbor for holding the blank stock, a templet governing the longitudinal movement of the arbor during the formation of the spiral cut and the straight cut on the coiler, a gear on said arbor, a sliding frame supporting the arbor and having a rack, means for rotating said gear and shifting said frame longitudinally after the rotary movement of the arbor has ceased, a pulley on the arbor, and a shiftable key for establishing operative connection between the arbor and the gear at one time and the arbor and the pulley at another time, one end of the key terminating in a coiler 18 for manipulation by the operator.

20. A coiler making machine comprising, in combination with the tool and the arbor for holding the blank stock, means for simultaneously rotating and moving the arbor longitudinally and also for moving the arbor longitudinally without rotation, such operations being continuous to produce a coiler having a spiral and a straight or longitudinal cut, a rotary tool holder for the tool, a pinion on such holder, and a gear meshing with said pinion and controlled by the longitudinal movement of the arbor for presenting the tool squarely to the advancing cut.

21. A coiler making machine comprising, in combination with the tool and the arbor for holding the blank stock, means for simultaneously rotating and moving the arbor longitudinally and also for moving the arbor longitudinally without rotation, such operations being continuous to produce a coiler having a spiral and a straight or longitudinal cut, a rotary tool holder for the tool, a pinion on such holder, and an oscillating segmental gear meshing with said pinion and operatively connected with and rocked by the arbor.

22. A coiler making machine comprising, in combination with the tool and the arbor for holding the blank stock, means for simultaneously rotating and moving the arbor longitudinally and also for moving the arbor longitudinally without rotation, such operations being continuous to produce a coiler having a spiral and a straight or longitudinal cut, a sliding frame supporting the arbor, a plate carried by such frame and having a cam slot, a rotary tool holder for the tool, a pinion on such holder, an oscillating segmental gear meshing with said pinion and having a roller engaged by such cam slot for oscillating the same.

23. A coiler making machine comprising, in combination with the tool and the arbor for holding the blank stock, means for simultaneously rotating and moving the arbor longitudinally and also for moving the arbor longitudinally without rotation, such operations being continuous to produce a coiler having a spiral and a straight or longitudinal cut, a rotary tool holder for the tool, a sleeve around such holder and movable longitudinally with such holder, a ratchet wheel on the sleeve, and a pawl controlled by the longitudinal movement of the arbor for operating the ratchet wheel.

24. A coiler making machine comprising, in combination with the tool and the hollow arbor for receiving and holding the blank stock, means for simultaneously rotating and moving the arbor longitudinally and also for moving the arbor longitudinally without rotation, such operations being continuous to produce a coiler having a spiral and a straight or longitudinal cut, a sliding frame supporting the arbor, a tool holder mounted to be advanced to and removed from the work, and means carried by such

frame for so moving the holder at the ends of the strokes of the frame, and a templet with which said means coöperate, and which corresponds with the coiler to be produced.

25. A coiler making machine comprising, in combination with the tool and the arbor for holding the blank stock, means for simultaneously rotating and moving the arbor longitudinally and also for moving the arbor longitudinally without rotation, such operations being continuous to produce a coiler having a spiral and a straight or longitudinal cut, a sliding frame supporting the arbor, a tool holder mounted to be advanced to and removed from the work, a tool post having a hub receiving the holder, a sleeve within the post and operatively connected with the holder for moving the same longitudinally, and an operating connection actuated by longitudinal movement of the frame for oscillating the sleeve in one direction or the other.

26. A coiler making machine comprising, in combination with the tool and the arbor for holding the blank stock, means for simultaneously rotating and moving the arbor longitudinally and also for moving the arbor longitudinally without rotation, such operations being continuous to produce a coiler having a spiral and a straight or longitudinal cut, a sliding frame supporting the arbor, a tool holder mounted to be advanced to and removed from the work, a tool post having a hub receiving the holder, a sleeve within the post and operatively connected with the holder for moving the same longitudinally, and an operating connection actuated by longitudinal movement of the frame for oscillating the sleeve in one direction or the other, comprising an oscillating yoke 51, a pin 53 secured to said sleeve and engaged by the yoke, said hub having an angular slot through which the pin passes, and means for rocking the yoke in one direction or the other.

27. A coiler making machine comprising, in combination with the tool and the arbor for holding the blank stock, means for simultaneously rotating and moving the arbor longitudinally and also for moving the arbor longitudinally without rotation, such operations being continuous to produce a coiler having a spiral and a straight or longitudinal cut, a sliding frame supporting the arbor, a tool holder mounted to be advanced to and removed from the work, a tool post having a hub receiving the holder, a sleeve within the post and operatively connected with the holder for moving the same longitudinally, and an operating connection actuated by longitudinal movement of the frame for oscillating the sleeve in one direction or the other, comprising an oscillating yoke 51, a pin 53 secured to said sleeve and engaged by the yoke, said hub having an angular slot through which the pin passes, and projections 55 and 56 on the slide frame for rocking the yoke in one direction or the other, said projections consisting of adjustable screws.

WILBER J. PINE.

Witnesses:
A. E. THOMPSON,
R. P. ZINN.