F. H. RICHARDS.

COILING AND FEED MECHANISM.

APPLICATION FILED JUNE 15, 1909.

957,905. Patented May 17, 1910.

Fig. 1.

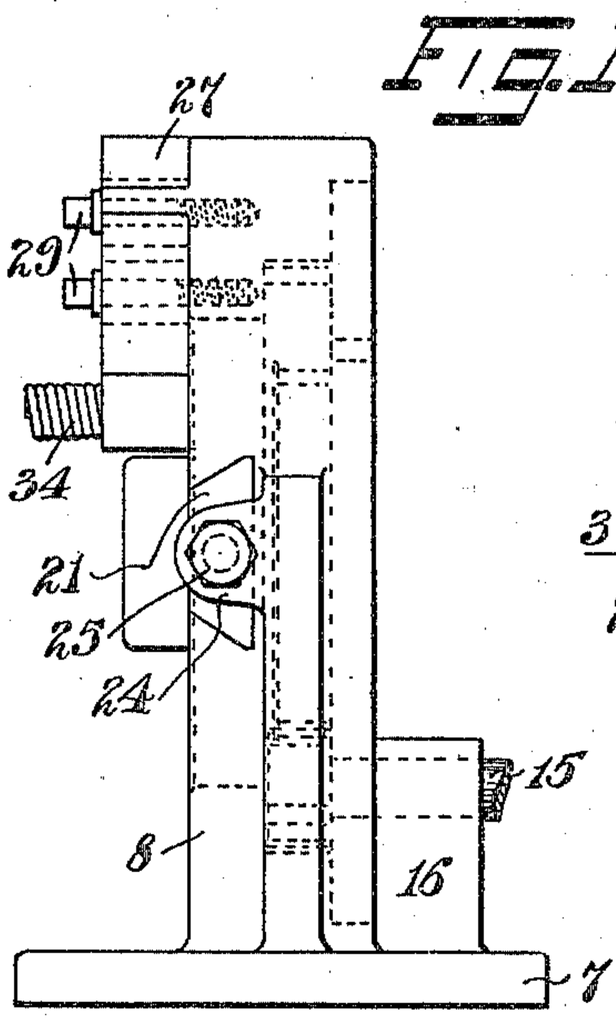


Fig. 2.

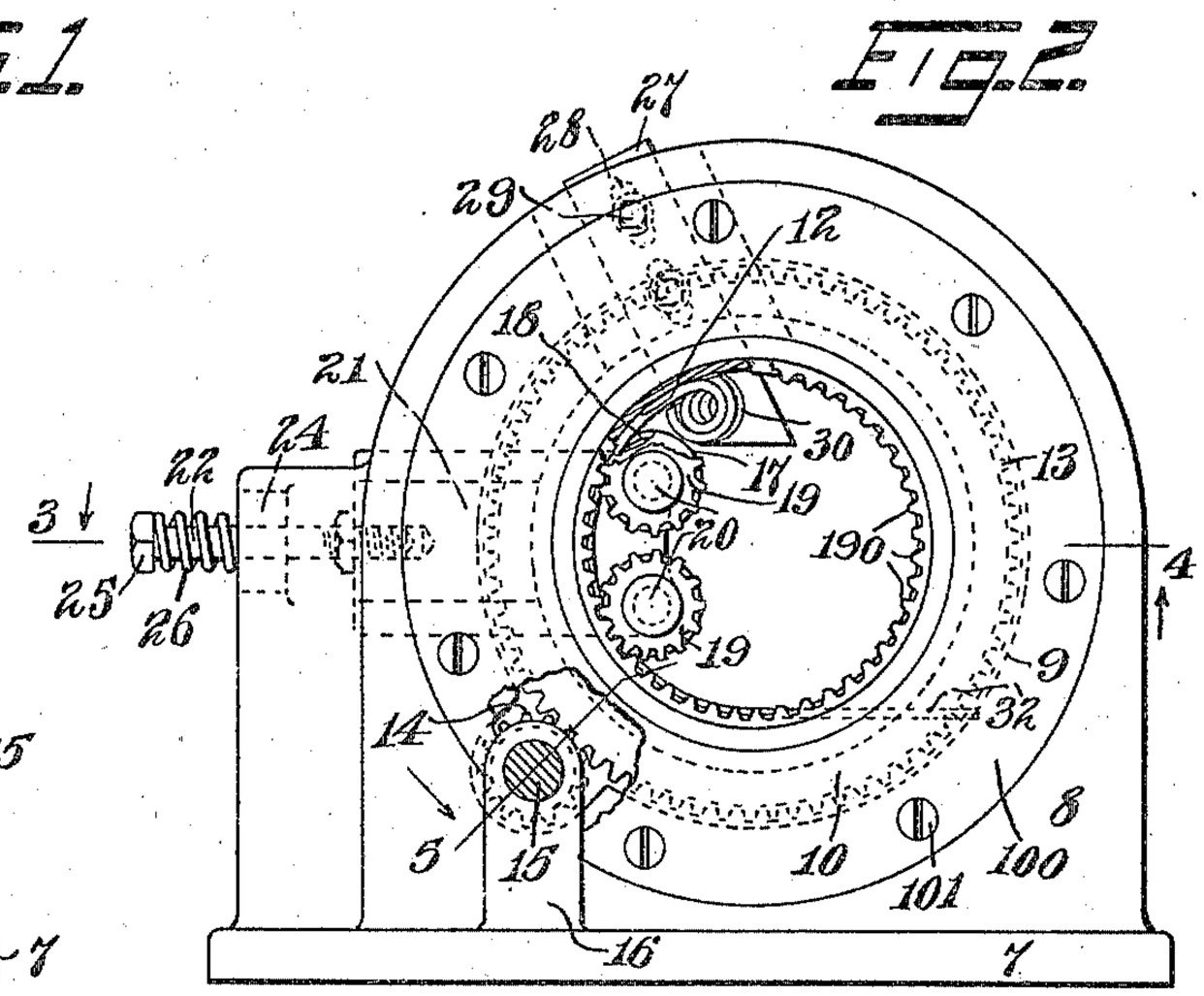


Fig. 5.

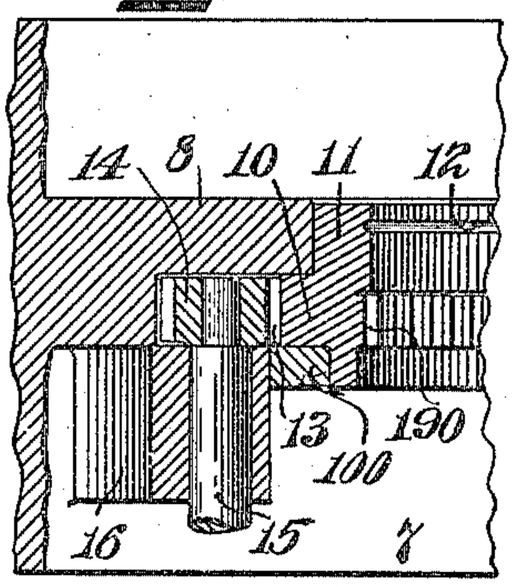


Fig. 3.

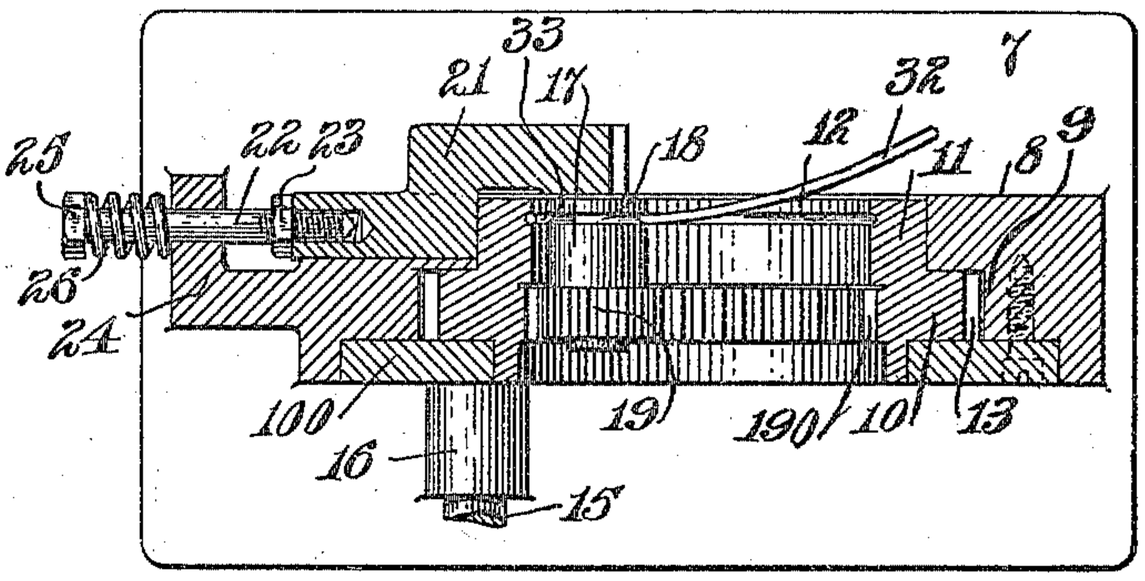


Fig. 6.

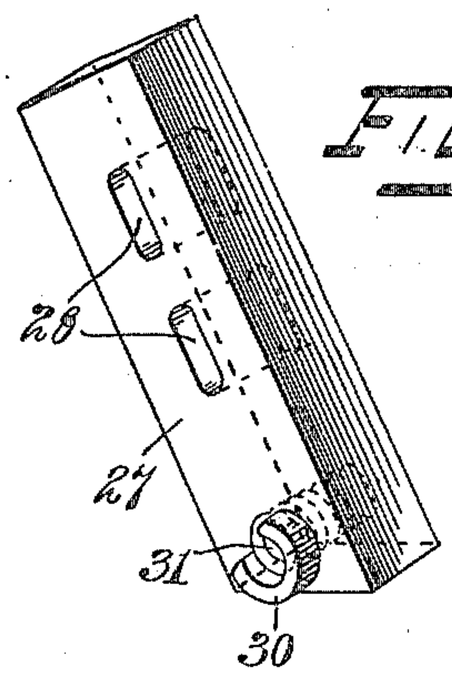
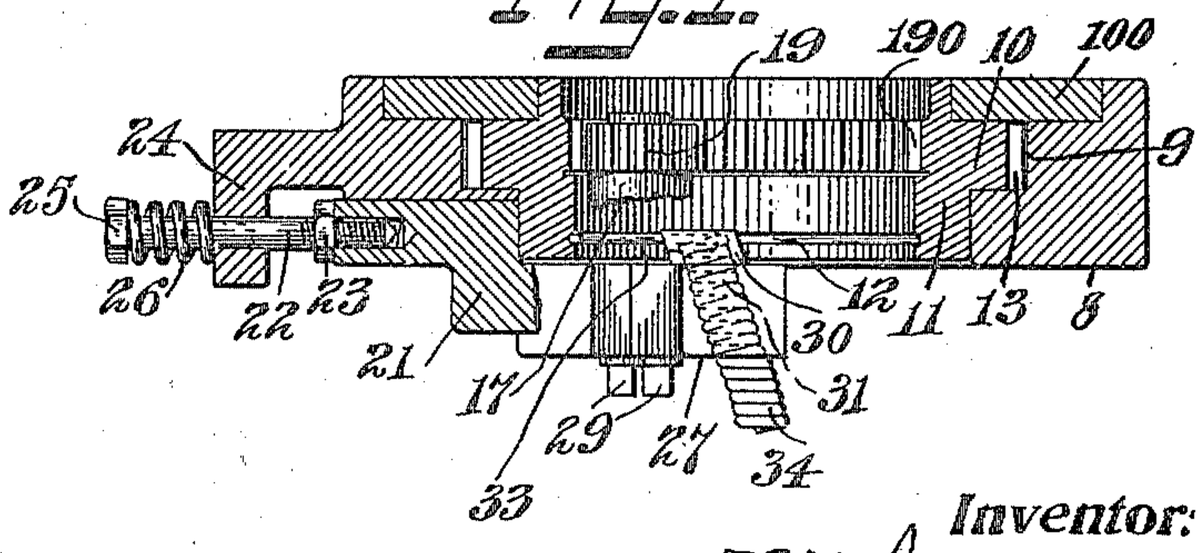


Fig. 4.



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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

COILING AND FEED MECHANISM.

957,905. Specification of Letters Patent. Patented May 17, 1910.

Application filed June 15, 1909. Serial No. 502,205.

To all whom it may concern:

Be it known that I, FRANCIS H. RICHARDS, a citizen of the United States, residing in Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Coiling and Feed Mechanism, of which the following is a specification.

This invention relates to coiling mechanism, and has for an object to provide improved coiling mechanism embodying an improved feed, capable of delivering the stock directly from a moving member to the coiling die, and which stock feed in addition to its feeding capacity will act as an auxiliary coiling device for preliminarily bending the stock.

This improvement relates to the utilization of an internal-face roll in combination with an external-face roll for feeding a rod or wire to a coiling device, usually a solid coiling die. The rod will, by the action of the said rolls, as these feed it to the die, be preliminarily shaped into a curved form. The forwarding pressure produced by the operation of the rolls causes the rod when thus curved to have a tendency to bend outwardly against the face of the internal-faced roll or member. By reason of this feature the said internal face constitutes and operates as a traveling bed upon and against which the rod is pressed and carried forward and from which it is delivered directly to the working face of the die. By means of this peculiar and very effective organization of the said coöperating devices the rod is positively controlled and is also positively fed forward without there being any intervening space between the rod feeding devices and the die itself. In fact a certain portion of the internal face over and adjacent to the opening in the die (into which opening the rod passes from the said face to the interior of the die) constitutes in effect a part of the die itself, with the additional feature that such part of the die thus formed outside of the die proper by the said traveling face is a moving surface and not a stationary one. It will now be evident how the employment of the said traveling internal-face operates in such a manner that the friction of the rod against said face (by reason of the pressure of the rod thereon) operates to assist the proper delivery of the wire or rod into the die, and operates also to assist in forcing forward the whole of the rod into the die, even when the rod has been coiled up with the exception of a very small length of the same at the rear end of the rod.

In the drawings accompanying and forming a part of this specification an embodiment of a form of my invention is illustrated wherein—

Figure 1 is an end view. Fig. 2 is an elevational view of the mechanism shown in Fig. 1. Fig. 3 is a plan view taken on a plane at about the line 3—4 of Fig. 2 looking downwardly or in the direction of the arrow placed adjacent to the index 3. Fig. 4 is a plan view taken on a plane indicated by the line 3—4 in Fig. 2 but looking upwardly or in the direction of the arrow placed adjacent to the index 4. Fig. 5 is a section taken on a plane at about the line 5 in Fig. 2 looking in the direction of the arrow placed adjacent to such line; and Fig. 6 is a perspective view of a coiling die.

The mechanism is shown as mounted upon a base 7 which has formed integrally with it an upstanding portion 8 which is chambered out at 9 for receiving a flange portion 10 of a member 11 which is located therein. Such member 11 in the present instance is annular and has on its internal periphery a circumferential stock engaging face 12. The flange 10 is held in chamber 9 by means of a ring 100 and screws 101. The flange 10 is shown as provided with gear teeth 13 which will mesh with the driver, herein illustrated as a pinion 14 mounted upon a shaft 15 which is supported by a standard 16. The member 11 or its internal-face constitutes one roll of the feed rolls, and the present illustration shows operating in conjunction therewith a pair of rolls 17 each of which is provided upon its outer perimeter with a circumferential stock engaging face 18, which external faces are coöperative with the stock engaging face 12 of the internal-faced roll. Each of these rolls 17 is provided with a pinion 19, which pinions are in mesh with internal gear teeth 190 carried by the member 11. The rolls 17 are mounted upon stub shafts 20 which are carried by a slide 21 supported in ways in the web 8. The slide 21 carries a stem 22 which is in screw threaded engagement with the slide and is provided with a lock nut 23 for securing the adjustment effected by the stem. The stem is shown as passing through an apertured arm 24, and provided with a head 25, between which head and arm is inserted

a compression spring 26 of sufficient strength to hold the rolls 17—17 in proper working relation in respect to the roll 11. Adjustment of the tension of the spring may be had by screwing the stem 22 in or out of the screw threaded socket in which it is seated and then setting down the set nut 23. The head 25 is provided for the engagement of a wrench.

The coiling die is illustrated in perspective in Fig. 6, and comprises a body portion 27 which is provided with elongated bolt holes 28 for receiving tap bolts 29. The die proper is provided with a portion 30 which projects into the interior of the annular roll 11 and is located in proper relation to the faces 12 and 18 for receiving the rod as this passes from between the bite of the rolls. This portion 30 is of course open at one side for receiving the stock. The stock will pass from the portion 30 into a circumferentially closed die portion 31 which may if desired be given a thread formation so as to facilitate the proper and normal movement of the coil as this is being formed.

It will be noticed that by the fact of the smaller internal rolls engaging the rod and forcing this against the internal face of the coöperative feed roll a relatively longer field of engagement between the rolls and rod is had than in cases where the rod is passed between an ordinary pair of feed rolls. It will also be noticed that the rolls acting as they do to force the rod 32 forward and about an internal face, such as 12, will bend such rod into a curved formation, as at 33, which is auxiliary and assistant to the coiling of such rod, this being as it were, the inauguration of the coil bending.

The completed product is illustrated at 34.

The inner or smaller rolls 17 act to press the rod against the face 12 which moves forward with the stock which presents a moving face between the place where the stock comes out from between the bite of the rolls to the place where it enters into the die, so that such inner face constitues a movable guide for the rod between the point where the rolls cease to act upon it as a pair of feed rolls and where it is received by the coil forming device.

In building machines embodying the principles of this invention for practicable use the size of the stock as well as the material from which it is made and the degree of hardness at which such material will be used will be taken into consideration in designing the mechanism and in arriving at the relative strengths and sizes of the various parts which are employed. In some cases a plain die consisting of a single part properly shaped and located will be sufficient, especially when making springs of relatively small size. In other cases I prefer to employ a coiling device having or comprising one or more rolls located for bending and closing in the rod to the proper diameter spirally and to the required pitch or degree of spirality.

One feature involved in this present improvement, namely that of having two rotating members one located within the other and whose axes of rotation are eccentric one to the other and each of said members being provided with a continuous circumferential working face which said faces form a working pass at their arc of nearest approach one to the other, and which members are arranged eccentrically one to the other, is, so far as it appertains to rolling mechanism, illustrated and claimed in my application for Letters Patent filed April 30, 1902, bearing Serial Number 105,273.

In my copending application Serial No. 505,952, filed July 6, 1909, there is disclosed and claimed mechanism embodying rotary stock forming dies for feeding directly to a coiling device the stock which is fed forward and formed at the working pass between such rotary dies.

Having described my invention I claim:

1. In a coiling machine the combination with coiling means, of a feed roll having an inner circumferential stock engaging face and a feed roll having an outer circumferential stock engaging face, said rolls being located for feeding the stock directly to the coiling means.

2. In a coiling machine the combination with coiling means, of two rotating members located one within the other and whose axes of rotation are eccentric one to the other, each of said members being provided with a continuous circumferential working face, said faces forming a working pass at their arc of nearest approach one to the other, and located for feeding the stock directly to the coiling means.

3. A coiling mechanism, comprising a feed embodying two rotating members located one within the other and whose axes of rotation are eccentric one to the other, each of said members being provided with a continuous circumferential working face, said faces forming a working pass at their arc of nearest approach one to the other, and a coiling die located adjacent said working pass in the line of stock feed movement.

4. The combination with an internal-faced roll, of a roll mounted within and coöperative with the internal-faced roll and forming a working pass for gripping the stock and forcing the same forward, means for rotating said rolls at the same surface speed, a circumferentially closed coiling die having an open sided portion located adjacent to the working pass of said rolls and in the line of stock feed movement therefrom.

5. The combination with a coiling die, of a feed therefor comprising two members lo-

cated one within the other and whose axes are eccentric one to the other, a working face upon the inner portion of the outer member and a working face upon the outer portion of the inner member, the two faces coöperating together to form a pass adjacent said die at a point which is in line with the axes of the two members and on the sides of the axes where the working surfaces of the two members are in the closest relation, the working portions of the faces which form the pass having the same relative movement with respect to the axis of one of the members, and means for guiding a stock rod into the said die.

6. The combination with a coiling die, of an internal and an external roll for feeding the stock to the die.

7. The combination with an internal-faced roll, of a pair of rolls mounted within and coöperative with the internal-faced roll for gripping the stock and forcing the same forward.

8. The combination with an internal-faced roll, of a pair of rolls mounted within and coöperative with the internal-faced roll for gripping the stock and forcing the same forward, and means for rotating said rolls at the same surface speed.

9. The combination with a coiling die, of an internal-faced roll and a pair of rolls mounted within and coöperative with the internal faced roll for gripping the stock and forcing the same into the die.

10. The combination with a coiling die, of an internal faced roll and a pair of rolls mounted within and coöperative with the internal-faced roll for gripping the stock and forcing the same into the die, and means for positively rotating the rolls at the same surface speed.

11. A ring provided on its outer periphery with guiding faces and with gear teeth, and on its inner periphery with a circumferential stock engaging face and with gear teeth, means for engaging said guiding faces, a pinion in mesh with said outer gear teeth for rotating the ring, a pair of rolls within said ring having on their outer peripheries circumferential stock engaging faces and gear teeth meshing with the internal gear teeth.

12. In a coiling machine, the combination with coiling means, of a roll having an inner circumferential stock engaging face and internal gear teeth, a roll having an outer circumferential stock-engaging face and located for feeding the stock directly to the teeth meshing with the said internal gear teeth.

13. The combination with a coiling die, of an internal and an external roll for feeding the stock to the die, said rolls being provided with intermeshing gears, and elastically yieldable means for holding the rolls in working relation.

14. A ring provided on its outer periphery with guiding faces and with gear teeth, and on its inner periphery with a circumferential stock engaging face and with gear teeth, means for engaging said guiding faces, a pinion in mesh with said outer gear teeth for rotating the ring, a slide movable radially of said ring, a pair of rolls carried by said slide and located within said ring having on their outer peripheries circumferential stock engaging faces and gear teeth meshing with the internal gear teeth, and elastically yieldable means active upon said slide for drawing the rolls against the ring.

15. The combination with a coiling die, of an internal and an external roll for feeding the stock to the die, said rolls being provided with intermeshing gears, spring pressed means for holding the rolls in working relation, and means for adjusting the tension of said spring.

16. A ring provided on its outer periphery with guiding faces and with gear teeth, and on its inner periphery with a circumferential stock engaging face and with gear teeth, means for engaging said guiding faces, a pinion in mesh with said outer gear teeth for rotating the ring, a pair of rolls within said ring having on their outer peripheries circumferential stock engaging faces and gear teeth meshing with the internal gear teeth, a circumferentially closed coiling die having an open sided portion, said open sided portion being located within the said ring and in the plane of its stock engaging face for receiving the stock as this is fed forward by the said ring and rolls.

Signed at Nos. 9–15 Murray St., New York, N. Y., this 25th day of May 1909.

FRANCIS H. RICHARDS.

Witnesses:
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FRED. J. DOLE.