No. 759,205. PATENTED MAY 3, 1904.

W. WATTIE.

DRILLING MACHINE.

APPLICATION FILED MAR. 5, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig 1.

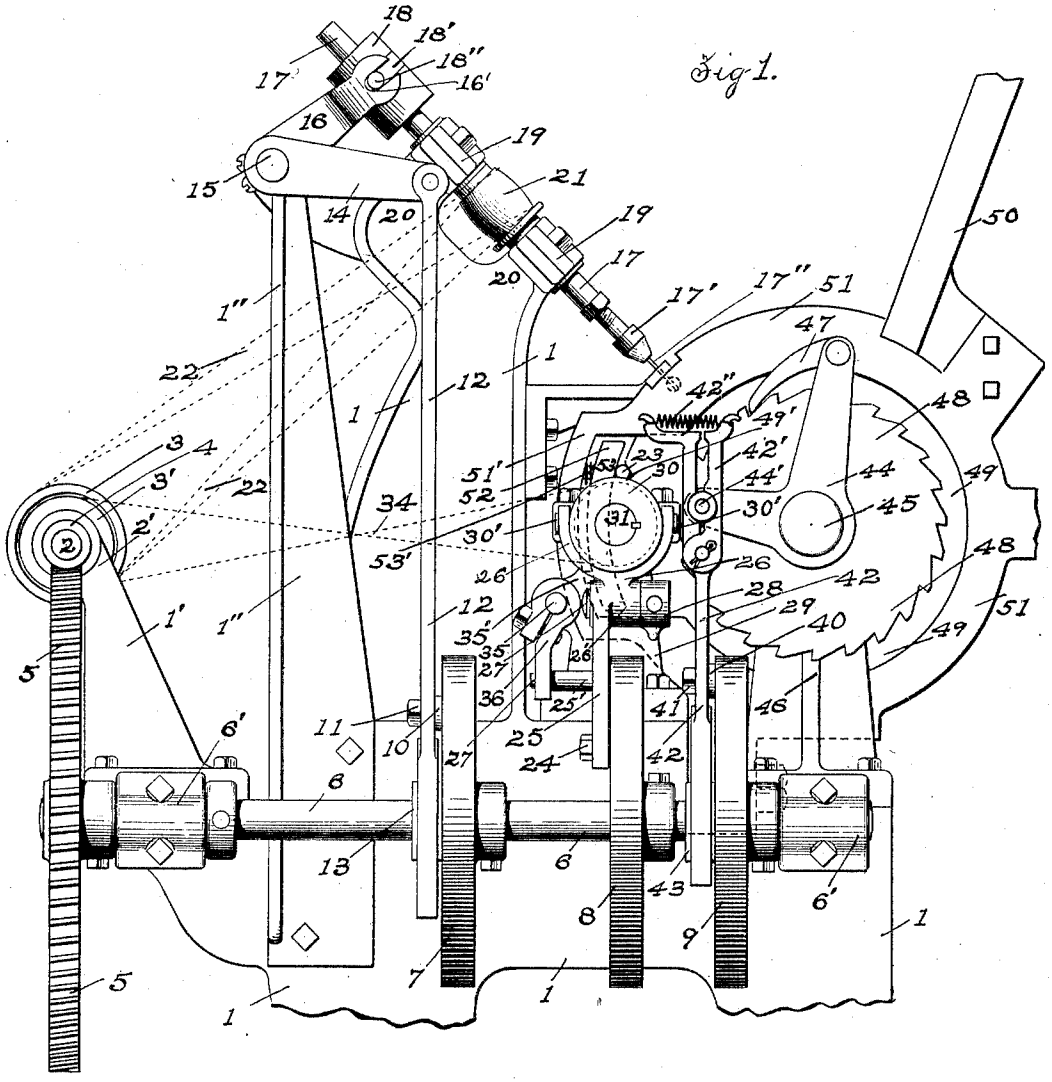


Fig 4.

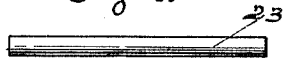
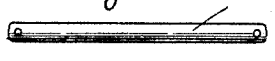


Fig 5.



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NO MODEL. 2 SHEETS—SHEET 2.

Fig 2.

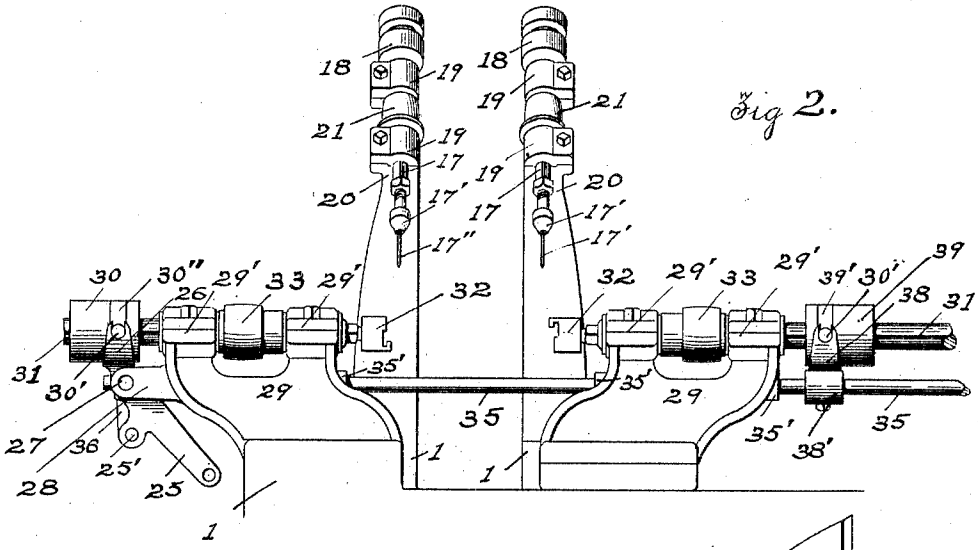
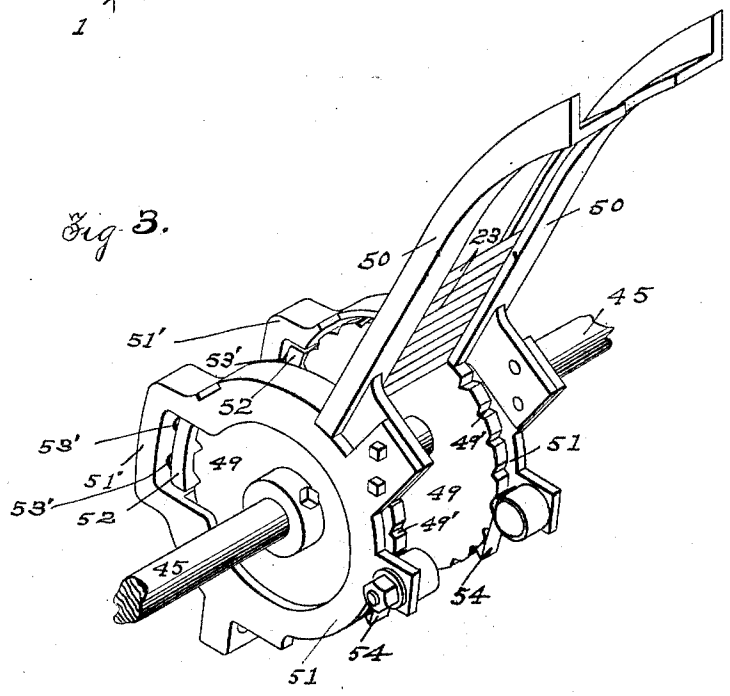


Fig 3.



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UNITED STATES PATENT OFFICE.

WILLIAM WATTIE, OF WORCESTER, MASSACHUSETTS.

DRILLING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 759,205, dated May 3, 1904.

Application filed March 5, 1903. Serial No. 146,285. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM WATTIE, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Drilling-Machines, of which the following is a specification.

My invention relates to a drilling-machine, and more particularly to an automatic machine for drilling a hole in each end of a metal rod or blank and rounding the ends thereof. Said rods, with a hole in each end and rounded ends, are particularly used in pattern-chains for looms and called "pattern-chain" bars, and they are connected at their ends and have tubes and rolls mounted thereon for pattern indicators or surfaces in the well-known way.

Heretofore in the manufacture of pattern-chain bars from metal blanks the hole in each end of the blank has been drilled on one machine and the ends of the blank rounded on another machine.

The object of my invention is to provide a machine for automatically feeding or carrying the blanks into position to be operated on by the drills and cutters and for holding them while they are being operated on and for simultaneously drilling a hole in each end of one blank and cutting or rounding the ends of another blank; and my invention consists in certain novel features of construction of my machine, as will be hereinafter fully described.

I have only shown in the drawings sufficient parts of a machine embodying my improvements to enable those skilled in the art to which my invention belongs to make and use the same.

Referring to the drawings, Figure 1 is an end view of a machine embodying my improvements looking in the direction of arrow *a*, Fig. 2. Fig. 2 is a front view of the drills and the cutters for rounding the ends of the rods looking in the direction of arrow *b*, Fig. 1. The other parts shown in Fig. 1 are not shown in this figure. Fig. 3 is a perspective rear view of the magazine and feed-rolls and the hoods extending over the feed-rolls detached from the other parts shown in Fig. 1. Fig. 4 shows a blank before it is operated on by my machine, and Fig. 5 shows the blank shown in Fig. 4 after it has been operated on preparatory for use as a pattern-chain bar.

In the accompanying drawings, 1 is the frame of the machine. 2 is a driven shaft mounted in bearings 2′ on the stands 1′ on the frame 1 and carrying the belt-pulleys 3 and 3′ and the pinion 4 on one end, which pinion meshes with and drives the gear 5, fast on one end of the shaft 6, mounted in bearings 6′ on the frame 1. The shaft 6 has fast thereon three cams 7, 8, and 9, having cam-grooves in one face. The cam-groove in the cam 7 receives a roll 10 on a stud 11, secured in the lower end of the upright rod 12, which is forked at its lower end to receive a collar 13 on the shaft 6.

The rod 12 at its upper end is pivotally connected to the outer end of an arm 14, which is fast at its inner end on a rock-shaft 15, mounted in bearings on the upper ends of stands 1″, secured to the frame 1. Also fast on the rock-shaft 15 are two arms 16, (only 1 is shown in Fig. 1,) one arm for each end, to receive a collar 18, fast on the drill-spindle 17 and adapted to rotate with said spindle. The yoke end of the arms 16 has lots 16′ therein to receive pins 18″, extending out from a ring 18′, loosely mounted in an annular groove in the collar 18.

The drill-spindles 17 are mounted to revolve in bearings 19 on the upper ends of stands 20 on the frame 1 and also to have a longitudinal motion in said bearings in the ordinary way. A belt-pulley 21 is loosely splined on each drill-spindle 17 to cause the spindle to revolve with said pulley and allow it to move longitudinally independently of said pulley. Each pulley 21 is belted to a pulley 3, fast on the driven shaft 2, by a belt 22. (Shown by broken lines in Fig. 1.) In a holder 17′, secured to the lower end of each drill-spindle 17, is secured a drill or tool 17″ for drilling a hole in each end of the blank 23.

I will now describe the mechanism for operating the cutters which round the ends of the blanks after the holes have been drilled in the ends by the drilling mechanism above described.

Into the cam-groove in the face of the cam 8 extends a roll on a stud 24, fast in the lower end of an arm 25, extending down from a hub 26′ on the forked or yoked arm 26. The hub 26′ is loosely mounted on a stud 27 in the end of an arm 28 on the stand 29 on the frame 1. (See Fig. 1.) The yoke 26 has slots 26″ therein which receive pins 30″ on a ring 30′ in an annular groove in a collar 30, fast on the cutter spindle or shaft 31, to rotate with said spindle. The spindle or shaft 31 is mounted in bearings 29′ on the stand 29 to revolve and move longitudinally therein and has secured upon its inner end a cutter or tool 32, adapted to engage and cut the ends of the blanks to round the same. A belt-pulley 33 is loosely splined on the cutter spindle or shaft 31 to communicate rotary motion to said cutter spindle or shaft and allow the spindle or shaft to have a longitudinal motion. The belt-pulley 33 is connected by a belt 34 (shown by broken lines in Fig. 1) with a pulley 3′ on the driven shaft 2.

In order to cut or round both ends of the blanks simultaneously, there is a second cutter or tool mechanism of the same construction and operation as the one already described. (See Fig. 2.)

The two cutter mechanisms are connected to cause the cutters to move simultaneously toward and away from each other in operating on the ends of the blank by a rod 35, mounted to slide longitudinally in bearings 35′ on the stands 29. One end of the rod 35 has thereon a strap or link 36, (see Fig. 1,) which is connected at its lower end with a pin or stud 25′ of the arm 25. The opposite end of the rod 35 has fast thereon the hub 38′ of a yoke-arm 38, which receives pins 39″ on a ring 39′, loosely mounted in an annular groove in the collar 39, fast on the cutter-spindle 31. It will be seen that the revolution of the cam 8 through arm 25 and the yoke-arm 26 will communicate a longitudinal motion to the cutter-spindle 31 and the cutter 32 thereon to move the cutter toward and away from the end of the blank to be operated on. A rotary motion is communicated to said cutter-spindle and cutter through belt connection 34, above described. Simultaneously with the longitudinal movement of said cutter-spindle and cutter a longitudinal movement is communicated to the other spindle and cutter through the yoke-arm 38, rod 35, strap or link 36, and stud 25′ on the arm 25.

I will now describe the mechanism for holding the metal rods or blanks and feeding them to the drills and cutters.

Into the cam-groove in the face of the cam 9 on the shaft 6 extends a roll 40 on a stud 41, secured to the vertically-moving rod 42, which is forked or slotted at its lower end to receive a collar 43 on the shaft 6. The upper end of the rod 42 is connected in this instance by a give-way device consisting of an arm 42′, pivoted at its lower end on the upright rod 42 and connected at its upper end by a spring 42″ with the upper end of the upright rod 42, with a pin 44′, which extends into a notched portion in the rod 42 and in the arm 42′ and is secured to one arm of an angle-lever 44, loosely mounted on a shaft 45, which is mounted in bearings 46 on the frame 1. On the opposite arm of the angle-lever 44 is pivoted a pawl 47, adapted to engage and rotate a ratchet-wheel 48, fast on the shaft 45, as the angle-lever 47 is rocked or moved by the rod 42, operated by the cam 9. Fast on the shaft 45 are two feed wheels or rolls 49, having grooves or recesses 49′ in their peripheries to receive the blanks or rods 23 as they drop by gravity from the guides 50, which form the magazine or reservoir for the blanks. Extending over the feed wheels or rolls 49 are the hoods or covers 51, secured to a stationary part of the machine. The hoods 51 act to hold the blanks 23 in the grooves or recesses 49′ in the feed wheels or rolls 49 as said wheels or rolls revolve and during the operation of the drills, as shown in Fig. 1. Upon the inner side of the hoods 51 and extending within an offset 51′ thereon are curved spring-clamps 52, having studs 53 to slide in said offset parts 51′ and spiral springs 53′ on said studs to press the clamps against the blanks 23, which are in position to be acted on by the cutters, and thus hold them firmly in place in the recesses 49′ on the feed-rolls 49 during the operation of the cutters to round the ends of the blanks. At the rear of the hoods 51 are secured in this instance blades or springs 54, the free ends of which are adapted to engage and extend into the recesses 49′ in the feed-rolls 49. The blades 54 act to keep clear the recesses 49′ and remove any filings which catch therein. A regular intermittent motion is communicated to the feed-rolls 49 to carry the blanks 23 from the reservoir into position to be operated on by the drills and then to be operated on by the cutters for rounding the ends through the ratchet-wheel 48, operated by the pawl 47 on the rocking angle-lever 44. While the drills are drilling a hole in each end of the blank, the cutters or tools are simultaneously rounding the ends of a blank in which the holes have already been drilled.

From the above description in connection with the drawings the operation of my improvements will be readily understood by those skilled in the art.

The relative positions of the two guides 50, extending up from the hoods 51 and forming the reservoir or magazine for the blanks are adjusted by moving the hoods 51 toward or away from each other on the shaft 45 according to the length of the blanks to be operated on. The relative position of the drills and of the cutters are also adjusted according to the length of the blanks to be operated on by adjusting the stands supporting the bearings of

said drills and cutters. The blanks are placed in the magazine or reservoir, as shown in Fig. 3, and drop by gravity into the recesses 49' in the feed-rolls 49, as said feed-rolls are revolved.

The revolution of the feed-rolls 49 in the manner above described carries one blank at a time into position to be operated on by the two drills, one at each end of the blank, and at the proper time the drills, which are continuously rotated, are moved downwardly through the revolution of the cam 7 on the shaft 6 and intermediate connections to cause the drills to engage and bore the holes in the blanks. After the holes are bored the drills are withdrawn preparatory to the feeding forward of another blank and the repeating of the drilling operation. After the holes are bored in the ends of the blanks by the drills in the continued revolution of the feed-rolls 49 the blanks are brought into position to be operated on by the cutters. The cutters, which are continuously rotated, at the proper time are simultaneously moved toward the ends of the blanks to engage and round the ends thereof and are then moved away from the blanks preparatory to operating on the next blank. After the blanks have been drilled and the ends rounded they drop out of the feed-rolls 49 by gravity into a receptacle placed to receive them.

The advantages of my improvements will be readily understood by those skilled in the art.

I provide an automatic machine for drilling a hole in each end of a blank or rod and also for rounding each end of the blank or rod, the drilling of the holes and the rounding of the ends being simultaneously performed on different blanks, and also mechanism for holding the blanks and feeding them to the drills and cutters.

It will be understood that the details of construction of my improvements may be varied, if desired.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a machine of the class described, the combination with a reservoir or holder for the blanks, to be operated on, rotary feeding means for positioning and holding the blanks, and intermittently carrying them into position to be operated on, of one or more drills disposed radially to said rotary means, and means for operating the same, to drill a hole or holes in the blanks, and one or more cutters or tools disposed parallel to the axis of said rotary feeding means, and means for operating the same, to cut or round the ends of the blanks, the drills and cutters being positioned with respect to each other for drilling the holes and rounding the ends simultaneously on different blanks.

2. In a machine of the class described, the combination with a reservoir or holder for the blanks, to be operated on, feeding means for positioning and holding the blanks, and intermittently carrying them into position to be operated on, of a plurality of drills disposed substantially at right angles to said feeding means, and means for operating the same, to drill a hole or holes in the blanks, and a plurality of cutters or tools disposed parallel to the axis of said rotary feeding means, and means for operating the same to cut or round the ends of the blanks, the drills and cutters being positioned with respect to each other for drilling the holes and rounding the ends simultaneously on different blanks.

3. In a machine of the class described, the combination of a reservoir or holder for the blanks to be acted upon, rotary feeding means disposed beneath the reservoir or holder and having a notched surface into which the blocks are fed, a pair of drills arranged in planes parallel to the plane of rotation of the feeding means to drill holes in said blanks, means for simultaneously advancing and operating said drills, a pair of oppositely-disposed cutters for rounding the ends of the blanks and arranged parallel to the shaft of the rotary feeding means, and yielding devices to hold the blanks in position on the rotary feeding means during the operation of the cutters.

4. In a machine of the class described, the combination of a reservoir or holder for the blanks to be acted upon, a feed roll or wheel disposed beneath the reservoir or holder near each end thereof, and each provided with a series of notches for receiving the blanks, a pair of drills radially disposed with respect to the said feed-rolls for drilling holes through the blanks near each end thereof, a pair of oppositely-disposed cutters arranged parallel to the axis of the feed-rolls, devices for simultaneously moving said cutters toward and from the ends of the blanks, and means for simultaneously operating the drills and cutters to cause the same to act simultaneously on different blanks.

5. In a machine of the character described, the combination of a reservoir or holder for blanks, a shaft carrying a pair of notched feed rolls or wheels adjustable toward and from each other beneath said reservoir or holder according to the length of blank to be treated, a pair of drills radially disposed with respect to said feed rolls or wheels and adjustable toward and from each other, a pair of cutters arranged parallel to said shaft, devices for moving said cutters simultaneously toward and from the ends of the blanks, means for intermittently rotating said feed-rolls, and means to simultaneously operate the drills and cutters to cause them to simultaneously act on a different blank while supported by the feed rolls or wheels.

6. In a machine of the class described, the combination of a reservoir or holder for the

blanks to be acted upon, a feed roll or wheel disposed beneath the reservoir or holder near each end thereof, and each provided with a series of notches for receiving the blanks, a pair of drills radially disposed with respect to the said feed-rolls for drilling holes through the blanks near each end thereof, a pair of oppositely-disposed cutters arranged parallel to the axis of the feed-rolls, a cam-shaft, cams mounted thereon, connection between one of said cams and the feed-rolls to intermittently rotate the latter, separate connections between the others of said cams, the drills, and the cutters for simultaneously moving the drills and cutters into operative position with respect to the blanks, and means for rotating said drills and cutters to cause them to simultaneously act upon different blanks.

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