

March 13, 1956

W. PLAGEMANN ET AL

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MACHINE FOR ROLLING SCREW THREADS, ETC.

Filed April 2, 1951

3 Sheets-Sheet 1

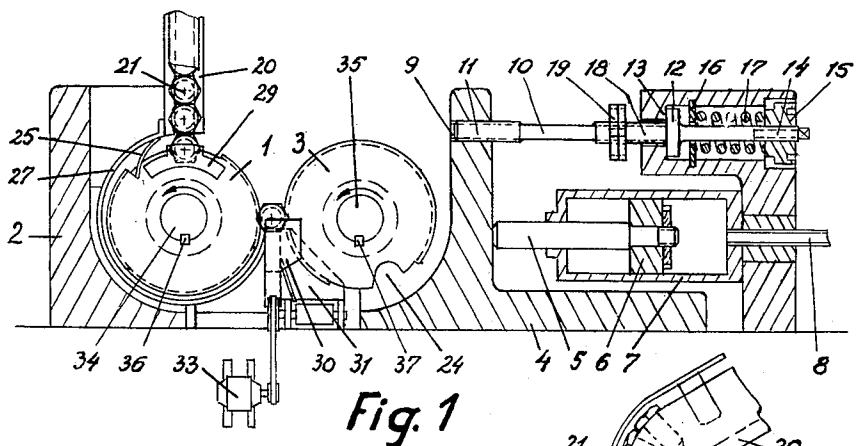


Fig. 1

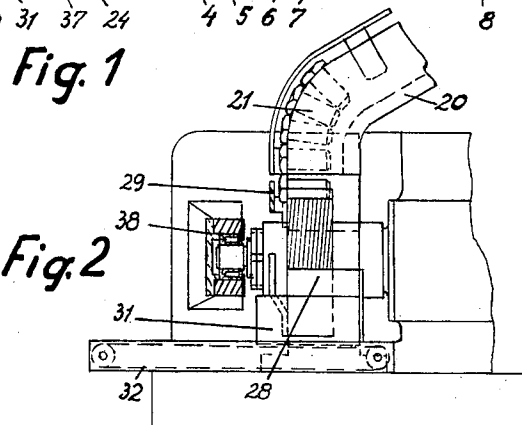


Fig. 2

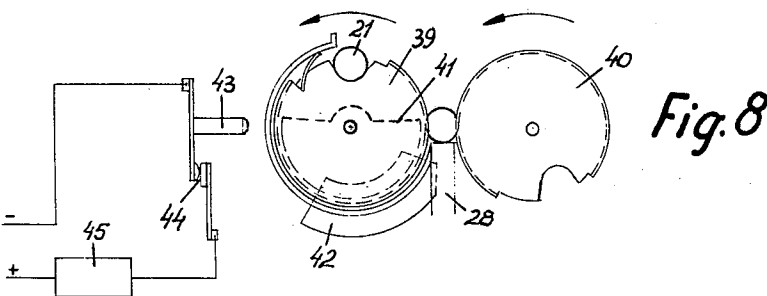


Fig. 8

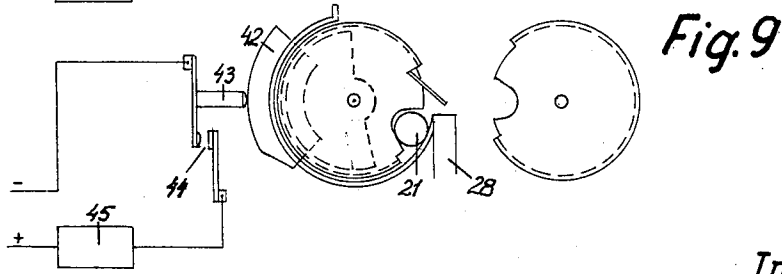


Fig. 9

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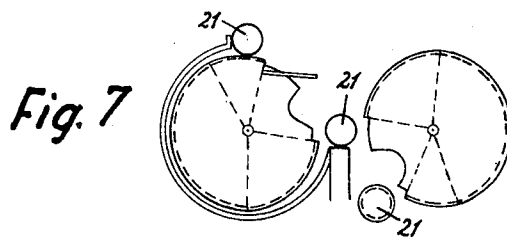
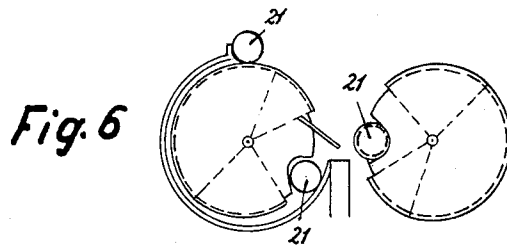
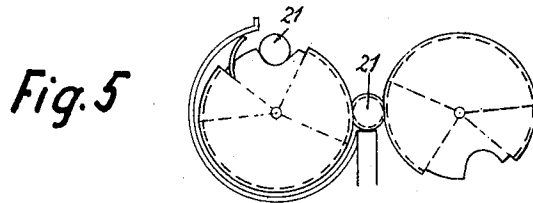
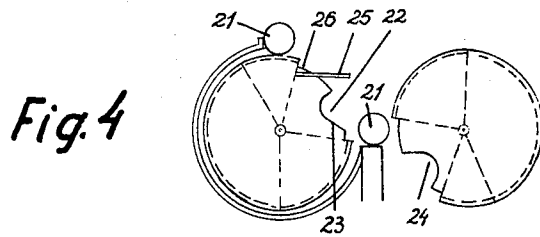
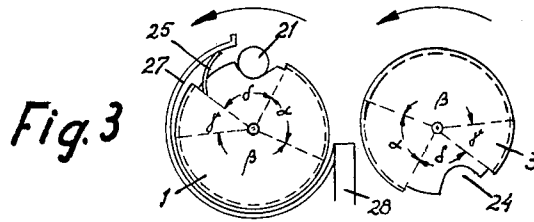
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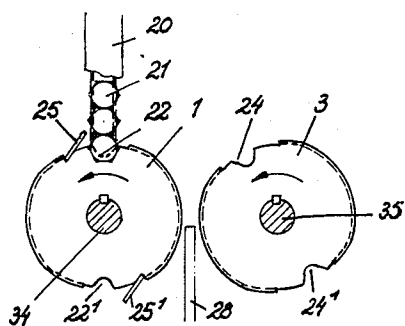


Fig. 10

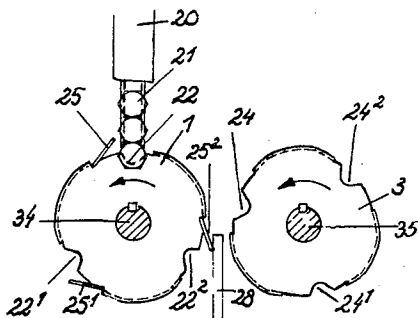


Fig. 11

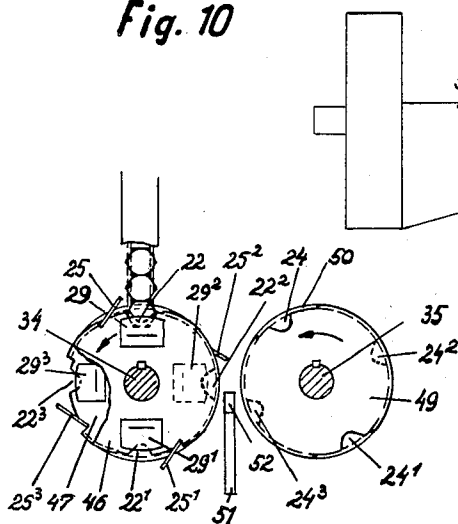


Fig. 12

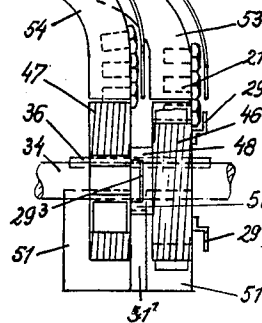
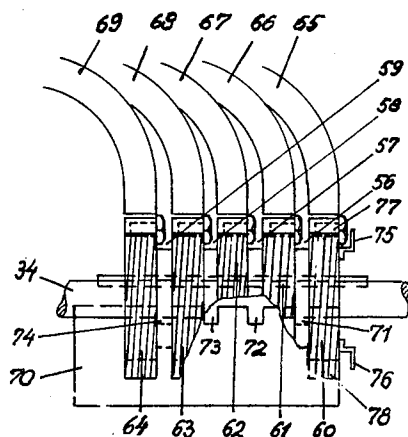


Fig. 13

Fig. 14



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MACHINE FOR ROLLING SCREW THREADS, ETC.

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Application April 2, 1951, Serial No. 218,716

Claims priority, application Germany April 3, 1950

9 Claims. (Cl. 80—6)

The present invention relates to a machine for rolling screw threads or the like on bolts, cap screws, etc. by means of a pair of rollers which are rotatably journaled parallel to each other in the same horizontal plane for rotation in the same direction and which during the thread rolling action are cutting by means of their thread forming serrations the screw thread into a work-piece positioned on a work-piece support arranged between the rollers, whereby the rollers are provided with means for the automatic conveyance of the work-blanks from a magazine to the work-piece support and for the automatic transfer of the finished work-pieces from the work-piece support to a collecting tank.

In machine tools of this type provided with rollers arranged parallel to each other in a horizontal plane, the automatic transfer of the work-pieces to and from the work forming station has so far been effected by means of special contrivances which convey the work-pieces from a separately arranged work receiving station (a magazine or the like) to the work forming position between the rollers, and which secure the work-pieces in that work forming station while the thread rolling is being done. The contrivance chiefly used for this purpose is a slide which, after it has been moved between the rollers, serves as a support for the work-piece. This additional machine needed for the transfer of the work-pieces to and from the work forming station requires a complicated device for the control of its operation. Moreover, as the slide is provided for the reception of the work-pieces with a recess, which is adapted in size to that of the work-pieces, the slide has to be exchanged whenever the size of the work-pieces changes. Furthermore, a contrivance of this known type is only suited for the automatic transfer of bolts of smooth cylindrical shape.

Hence, the principal object of the present invention is to provide machine tools, particularly thread rolling machines which have their rollers rotatably journaled parallel to each other in a horizontal plane, with simplified means for the supply of the work-blanks to the work forming station and for the removal of the finished work-pieces from the work forming station.

Another important object of the invention is to considerably increase the production of finished work-pieces at every revolution of the rollers.

According to the invention the supply of the work-blanks to, and the removal of the finished work-pieces from the work forming station is effected by the rollers themselves.

It is an important feature of the invention that the rollers by means of which the work-pieces are conveyed to and away from the work forming station are so devised that they can be arranged in thread rolling machines of the standard type whose work shafts are positioned in a horizontal plane. It is for this reason that the transfer of the work-pieces to and away from the work forming station is effected by means of notches provided in the rollers, whereby one of the rollers is further

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equipped with an ejector which is arranged in a recess of the roller for rotation therewith and which on its rotation past the finished work-piece ejects the latter from its support and hurls it into a notch of the second roller which on its peripheral travel around the second roller is at that moment positioned exactly opposite said ejectory whereupon when the rotation continues the finished work-piece is ejected by the second roller for conveyance to a collecting tank.

Another advantage of the invention resides in the feature that the two rollers are so devised and that their rotation takes place in such a direction that the work-piece, because of its rotation in the opposite direction, is caused to roll off the work-piece support in the direction of the second roller the very moment the notch of the second roller is passing by it.

It is also possible to devise the construction in such a way that the rollers as far as their notches are concerned are so arranged with respect to each other that the finished work-piece positioned on the work-piece support is ejected by the work-blank arriving in the notch of the work-piece supply roller from said work-piece support and propelled into the at that moment oppositely positioned notch of the cooperating roller for removal by the latter.

A further important feature of the invention is the way in which the ejector, consisting for instance of a leaf-spring or the like, is arranged at the roller. According to the invention the ejector is fastened in a recess of the roller and projects with its free end beyond the outer circumference of the latter. The recess in which the ejector is positioned takes up a substantial portion of the circumference of the roller and is provided with or merges into the notch into which the work-pieces drop when the notch on its circumferential travel around the axis of the roller passes beneath the magazine for the work-pieces. The ejector extends from the roller in ascending direction in such a manner that it is obliquely inclined toward the notch which in the direction of rotation of the roller is positioned closely behind the ejector. If the ejector is arranged like this it will not interfere in any way with the orderly performance of the rolling action and not require for its operation any special operating and controlling means such as outwardly arranged cams or the like. Furthermore, an ejector of this type will function also if work-pieces of comparatively short length are to be threaded which do not project beyond the ends of the rollers.

The invention further contemplates to arrange on each of the two work shafts a plurality of rollers behind one another in spaced apart relation, or on each of the two work shafts one single roller having a plurality of spaced apart rolling sections, whereby each of the rollers or rolling sections is provided with a plurality of notches and appertaining ejectors arranged in the circumference of the rollers or rolling sections in uniformly spaced apart relation. In this way it is possible to increase the production of finished work-pieces in conformity with the number of rollers or rolling sections employed and in accordance with the number of notches provided in the individual rollers or rolling sections.

If a plurality of rollers or rolling sections are arranged behind one another it is advisable, in order to avoid jerking and undue straining of the shafts or jamming of the finished work-pieces, to devise the construction in such a way that the notches of the rollers of one shaft are not disposed in horizontal alignment but uniformly displaced with respect to one another. In this way a smooth and unobstructed working of the rollers can reliably be obtained.

If the rollers are provided with a plurality of rolling sections these rolling sections are spaced apart by annular recesses in the rollers, whereby the width of the annular

recesses corresponds to or approximately corresponds to the width of the portions of the work-pieces, for instance the width of the head-portions of screw bolts, which are not to be threaded, while the width of the rolling sections corresponds to the length of the bolt portions which are to be provided with the threading. If, on the other hand, a plurality of individual rollers are to be mounted on one shaft, the width of each roller should correspond to the width of the aforesaid rolling sections, while the width of the distance regulating sleeves arranged between the individual rollers should correspond to the width of the annular recesses between the rolling sections.

As it is necessary that the portion of the work-pieces which is not to be threaded, for instance the head of the bolts, laterally projects from the work-piece support, the invention provides the work-piece support positioned between the two rows of rollers or rolling sections which are arranged behind one another with a plurality of recesses for the heads of the bolts to engage in, whereby these recesses are positioned in and correspond in width to the interspaces between the plurality of rollers or rolling sections created by the aforesaid distance regulating sleeves or annular recesses. The recesses in the work-piece support may be either cut out of the work-piece support, or be created by distance regulating pieces inserted between a plurality of individual work-piece supports. A work-piece supporting contrivance of this type extends over the entire length of the rollers or rolling sections arranged behind one another.

The increase in production obtained by a construction like this is shown by the following example:—

If small screw threads of for instance 5 x 16 mm. are to be rolled, the width of the rollers employed for the rolling should be 120 mm. If the entire length of the screw with the inclusion of its head is 20 mm., the rollers may be provided with six rolling sections and five annular recesses between the six rolling sections, so that simultaneously six work blanks can be supplied to the rollers. Depending upon the length of the diameter of the rollers, screws of 5 mm. thickness will require less than half a revolution of the rollers for the completion of the thread. Hence two or possibly three notches for the reception of the work-pieces can be arranged in the circumference of every rolling section, so that every revolution of the rolling sections will produce either two or three finished work-pieces. If the number of revolutions of the rollers is 2000 per hour, the production per hour will be

$$6 \times 2 \times 2000 = 24,000$$

finished work-pieces, in case of two notches per rolling section, or $6 \times 3 \times 2000 = 36,000$ finished work-pieces, in case of three notches per rolling section.

Protection against overloading of the rollers, for instance through an increase in diameter of the work-pieces, can be obtained if the construction is so devised that the slide of the roller will bear with a regulated hydraulic pressure against a stationary stop adjusted in conformity with the diameter of the finished work-pieces, so that in case of overloading of the rollers the latter will exert an elastic counter pressure.

The machine may be provided either with rollers which are stationarily journaled, or with rollers which are shiftably arranged for displacement transverse to the direction of their axes.

In the first mentioned case the rollers are so devised that, starting at the notch, the peripheral surface of the rollers gradually rises to the height corresponding to the full depth of the thread to be rolled, maintaining this highest surface level concentrically to the axis of rotation through a considerable section of the peripheral surface, whereupon at the end of the rolling path the surface level drops to such an extent that the finished threaded work-piece is then running idle between the two rollers

whose shafts are stationarily adjusted in spaced apart relation with respect to each other.

In the second case the surface of the rollers, apart from the recess and notch, is cylindrical and concentric to the axis of the rollers, while for the operation of the machine a controlling device is provided which controls the working stroke and the return movement of the rollers in conformity with the supply and removal of the work-pieces by means of the notches.

The invention will be best understood from a consideration of the following detailed description, taken in connection with the accompanying drawings, forming a part of this application and in which we have illustrated by way of example several embodiments of the invention. However, it is to be understood that the invention is not confined to any strict conformity with the showing of the drawings, but may be changed or modified, so long as such changes or modifications mark no material departure from the salient features of the invention as expressed in the appended claims.

In the drawings:

Fig. 1 is a front elevation, partly in section, of a thread rolling machine;

Fig. 2 is a side elevation of the machine of Fig. 1;

Figs. 3 to 7, inclusive, are views of a pair of thread rollers at various stages of the cycle of operation;

Figs. 8 and 9 are views of a pair of thread rollers provided with an electro-hydraulic controlling device which controls the working stroke and the return movement of the rollers;

Fig. 10 is a view of a pair of rollers provided at diametrically opposed places of their circumference with two notches for the reception and transfer of the work-pieces;

Fig. 11 is a view of a pair of rollers provided in their circumference with three notches which are displaced from each other at an angle of 120°;

Fig. 12 is a side elevation of two rollers mounted behind each other on a common shaft in spaced apart relation and provided in their circumference with notches which are displaced from each other at an angle of 90°;

Fig. 13 is a front elevation of the construction of Fig. 12;

Fig. 14 is a side elevation of a roller provided with five rolling sections and four annular recesses between the rolling sections; the notches are shown as being arranged in horizontal alinement.

Referring now to the drawings in detail, the thread roller 1 is stationarily journaled in the machine frame 2, while the thread roller 3 is shiftably mounted on the slide 4 for displacement transverse to the direction of its axis. Against the slide 4 presses the piston rod 5 of the piston 6, which is arranged in the cylinder 7. The pressure oil is supplied to the cylinder through the pipe 8.

The slide 4 is provided with the threaded hole 9, in which engages the threaded front portion 11 of the adjusting spindle 10. The adjusting spindle 10 carries a stop-member 12 which, when the oil pressure is exerted, bears against the bottom of the casing 13. At its rear end the adjusting spindle 10 is provided with the threaded portion 14 and the nut 15. Arranged between the ring 16 and the nut 15 is the pressure spring 17 by means of which the slide 4 is returned to its position of rest when the oil pressure upon the piston 6 stops. Mounted on the threaded portion 18 of the adjusting spindle 10 are the nuts 19 limiting the backward movement of the slide to the desired extent.

Positioned above the roller 1 is the magazine 20 from which the work-pieces 21 drop onto the roller 1. For the reception of the work-pieces the roller 1 is provided with the recess 22, having an inclined wall portion 23, while the roller 3 is provided with the recess 24. Fastened to the roller 1, adjacent the recess 22, is the leaf spring 25. It extends from the roller in ascending direction in such a manner that it is obliquely inclined toward the recess 22. The leaf spring is arranged in a recess 26 which does not carry thread forming serrations. The roller 1

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is surrounded by a guide cover 27 which is at one end fastened to the magazine 20 and at its other end to the work-piece support 28.

Exchangeably secured to the front end of the roller 1 before the recess 22 is a retaining member 29 of sheet metal or the like, while the work-piece support 28 is provided with a retaining member 30.

Positioned beneath the roller 3 is an inclined chute 31, and arranged underneath the chute is the conveying belt 32, which is driven from the motor 33.

The rollers 1 and 3 are fastened on the shafts 34 and 35 by means of the keys 36 and 37, whereby the rollers are adjusted with respect to each other at the angle required by the different stages of operation. The front bearing of the shafts 34 and 35 has been marked 38.

The rollers 1 and 3 are so devised that, starting in the vicinity of the notch 22 or 24 respectively, the peripheral surface of the rollers gradually rises in the area indicated by the angle α (see Fig. 3) to the height corresponding to the full depth of the thread to be rolled. In the area of the angle β this highest surface level is maintained concentrically to the axis of rotation, whereupon at the end of the rolling path in the area of the angle γ , the surface level of the roller drops to such an extent that the finished threaded work-piece is then running idle between the two rollers whose shafts are stationarily adjusted in spaced apart relation with respect to each other, so that no jerks will occur when the finished work-piece is removed and replaced by the work-blank. The recess 26 extends throughout the area of the angle δ . In the recess 26 the notches 22 and 24 respectively are positioned.

In the construction illustrated in Figs. 8 and 9 the rollers 39 and 40 are devised in the same way as the rollers 1 and 3 of Fig. 1, but of cylindrical shape. Fastened to the roller 39 for rotation therewith is the supporting member 41, to which the cam 42 is secured, which through operation of the contact-pin 43 breaks the electric contact 44 arranged in the circuit of the electro-hydraulic controlling device 45. In Fig. 8 the contact is closed and the rollers 39 and 40 perform their thread-forming operation. In Fig. 9 the contact 44 is interrupted and the rollers have been moved apart.

In Fig. 10 the notches 22, 22' and 24, 24' respectively have been arranged at diametrically opposed places of the rollers 1 and 3. The leaf springs serving as ejectors for the finished work-pieces have been denoted by 25 and 25' respectively, while the reference numeral 21 designates the work-pieces dropping out of the magazine 20.

In the construction illustrated in Fig. 11 the rollers 1 and 3 have been provided with three notches each arranged in the circumference of the rollers at an angle of 120° with respect to one another. The roller 1 is provided with the notches 22, 22' and 22'', while the roller 3 is provided with the notches 24, 24' and 24''. The leaf springs serving as ejectors for the finished work-pieces have been denoted by 25, 25' and 25''.

The constructions of Figs. 10 and 11 show how the production of finished work-pieces may be doubled or tripled by the provision in the circumference of the rollers of a corresponding number of notches for the reception and conveyance of work-blanks to the work-piece support and for the removal of the finished work-pieces from the work-piece support at the end of the thread-forming action.

A further considerable increase of production can be obtained if, as illustrated in Figs. 12, 13 and 14, a plurality of rollers or a roller provided with a plurality of thread-forming sections are arranged on the same shaft.

Fig. 12 shows how on a common work shaft 34 two rollers 46 and 47 have been arranged behind one another, whereby the width of the two rollers either exceeds or at least corresponds to the length of the work-pieces. The rollers are spaced apart by the distance regulating sleeve 48. Each of the rollers 46 and 47 is provided with two notches 22, 22' and 22'', 22'' respectively positioned at dia-

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metrically opposed places of the rollers, as illustrated in Fig. 13. The appertaining leaf springs have been denoted by 25, 25' and 25'', 25'' respectively. Arranged on the front side of the roller 46 before the notches 22 and 22' are the retaining members 29 and 29' of sheet metal or the like against which the work-blanks are resting with their head portions. The corresponding retaining members of the roller 47 have been marked 29'' and 29''. The cooperating rollers 49 and 50 are arranged on the work-shaft 35 at the same distance from each other as the rollers 46 and 47. The roller 49 is provided with the notches 24 and 24', while the roller 50 is provided with the notches 24'' and 24'''.

Positioned between the rollers 46, 47 and 49, 50 is the work-piece support 51 provided with the recess 52. The work-piece support consists of two parts spaced apart by the distance-regulating member 51'.

The work-blanks 21 are conveyed from a container 55 to places immediately above the rollers 46 and 47 by means of the guide members 53 and 54.

Fig. 14 shows a roller provided with the annular recesses 56, 57, 58 and 59, so that the spaced apart rolling sections 60, 61, 62, 63 and 64 are produced. The reference numerals 65, 66, 67, 68 and 69 designate the guide members for the work-blanks.

The work-piece support 70 is provided with the recesses 71, 72, 73 and 74. If the annular recesses between the rolling sections are just wide enough for the heads of the work-pieces to engage in, retaining members for the bolts will not be needed. In the construction of Fig. 14 retaining members 75 and 76 have been arranged only before the notches 77 and 78 of the first rolling section 60. For clearness of illustration the notches in the rolling sections 60, 61, 62, 63 and 64 have been shown in Fig. 14 as being disposed in horizontal alinement. However, in order to avoid jerking, displaced arrangement of the notches of the several rolling sections with respect to one another, as indicated in Figs. 12 and 13, is necessary. In case of five rolling sections, as illustrated in Fig. 14, the angle of displacement of the notches of one rolling section with respect to the notches of the next following or preceding rolling section is one-fifth of the entire circumference, i. e. 72°.

The machine operates as follows:

The work-blanks 21 drop from the magazine 20 successively onto the peripheral surface of the roller 1. When the roller 1 reaches the stage of its revolution illustrated in Fig. 3 the first work-blank drops into the notch 22, and when the revolution continues the work-blank is transferred from the work-receiving station beneath the magazine through a circumferential path between the roller 1 and the guide cover 27 to the work-forming station, while the next following work-blank drops onto the roller.

Fig. 4 shows the stage in the cycle of operation of the machine where the work-blank has dropped out of the notch 22 onto the work-piece support 28 via the obliquely inclined surface portion 23 of the notch. A moment later the rolling of the screw thread into the work-piece begins, which takes place in the area of the roller indicated by the angle α (see Fig. 5). At this stage of rotation of the roller the second work-piece drops into the notch 22. During the then following stage of rotation the rolling of the thread is completed in the area of the angle β , whereupon when the leaf-spring 25 is released by the guide-cover 27 the finished work-piece is ejected by the leaf-spring from its position on the work-piece support 28 and propelled into the notch 24 of the roller 3, which at this moment of its peripheral travel is positioned exactly opposite the leaf-spring.

In the meantime the third work-blank has dropped onto the roller, and a moment later the second work-piece drops onto the work-piece support, while the first work-piece drops out of the notch 24 and passes via the chute 31 and the conveying belt 32 into a collecting tank (see Fig. 7).

In the constructions illustrated in Figs. 8 and 9 the delivery of the work-blanks to the rollers 39 and 40 and the removal of the finished work-pieces from the rollers is effected in the same way as shown in Figs. 1 and 2.

The way in which the production may be increased has already been described. If, for instance, two notches are provided in the circumference every revolution of the rollers will produce two finished work-pieces, and if the roller is provided with five rolling sections five work-blanks will simultaneously be supplied to the rolling sections, so that in the embodiment illustrated in Fig. 14 every revolution of the rollers will produce 10 finished work-pieces.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. In a screw threading machine including two thread forming rollers arranged for cooperation with each other, one of said rollers being provided with a peripheral feeding recess for feeding a work piece to a working station, and the other roller being provided with a discharging recess for receiving a threaded work piece from said working station and discharging said threaded work piece, the combination of: supporting means arranged intermediate said rollers for supporting a work piece at said working station, and spring means mounted on said one roller adjacent the leading edge of the recess therein to move said work piece from said supporting means into the discharging recess of said other roller.

2. In a screw threading machine including two thread forming rollers, one of said rollers being provided with cut-out portions adapted to receive and feed a work piece to a working station between said rollers, the combination of: spring means mounted on said one roller, and fixed control means arranged adjacent a portion of the periphery of said one roller and adapted in response to a first predetermined position of said spring means relative to said control means to load said spring means and also adapted in response to a second predetermined position of said spring means relative to said control means to release said spring means, thereby allowing said spring means to become effective so as to remove said work piece from said working station.

3. In a screw threading machine including two rotatable thread forming rollers arranged for cooperation with each other, one of said rollers being providing with peripheral recess means adapted to receive a work piece at a feeding station and to transfer said work piece to a working station between said rollers, and the other one of said rollers being provided with a cut-out portion adapted to receive a threaded work piece at and to carry the same away from said working station, the combination of: leaf spring means carried by a serration-free peripheral portion of said one roller and protruding outwardly from said peripheral portion, said leaf spring means being arranged on that side of said recess means which precedes said recess means in the direction of rotation of said one roller, and an arch-shaped element extending from a point near said feeding station in the direction of rotation of said one roller to a point near said working station and being spaced from the outer periphery of said one roller by a distance less than the protruding portion of said spring means when the latter is in unloaded condition, said rollers being set relative to each other so that the cut-out portion of said other roller is adjacent said working station when said leaf spring means is leaving the range of said arch-shaped element.

4. A screw threading machine according to claim 3, in which said arch-shaped element is eccentrically arranged with regard to said one roller so as to form a path between said one roller and said arch-shaped element which path is higher at its entry section than at its central section, thereby facilitating the entry of said leaf

spring means between said one roller and said leaf spring means and the loading of the latter.

5. A screw threading machine according to claim 1, in which the two rollers are so arranged with respect to each other that said spring means in said one roller and the cooperating discharging recess in said other roller are substantially in the same horizontal plane when the feeding recess in said one roller has reached a position just below the supporting surface of said supporting means.

6. In a machine for roll forming work pieces including two forming rolls arranged for cooperation with each other, one of said rolls being provided with a plurality of peripheral feeding recesses for feeding work pieces to a work station, and the other of said rolls being provided with a plurality of discharging recesses for receiving threaded work pieces from said working station and discharging said threaded work pieces, the combination of: supporting means arranged intermediate said rolls for supporting a work piece at said work station, a plurality of spring means mounted on said one roll corresponding in number to the number of recesses of said one roll, said spring means being uniformly spaced from each other and being respectively arranged adjacent said last mentioned recesses so as to precede the latter in the direction of rotation of said one roll, and a control member adjacent a portion of the periphery of said one roll and arranged successively to load and release each of said spring means.

7. A machine for roll forming cylindrical work pieces comprising, a plurality of work forming rolls, one of said rolls being provided with means for feeding work pieces to a work station, the other of said rolls having a peripheral recess for receiving a formed work piece; at least one spring mounted on said one roll for movement therewith and adapted to project beyond the periphery of said one roll and resiliently contact a work piece positioned at said work station to thereby urge said work piece away from said work station into said recess in said other roll.

8. In a machine for roll forming cylindrical work pieces, a plurality of work forming rolls, one of said rolls being provided with means for feeding a work piece to a work station; at least one spring mounted on said one roll; relatively fixed control means surrounding a portion of said one roll and adapted to load said spring up to a point adjacent said work station and to release said spring when said spring approaches said work station, said spring being adapted when released to project beyond the periphery of said one roll and resiliently contact a work piece positioned at said work station to thereby urge said work piece away from said work station.

9. In a machine for roll forming cylindrical work pieces, at least two rotatable forming rolls arranged for cooperation with each other, peripheral recess means in one of said rolls adapted to receive a work piece at a feeding station and to transfer said work piece to a working station between said rolls, peripheral recess means on the other of said rolls adapted to receive a threaded work piece at said work station and to carry said work piece away from said work station, spring means mounted on said one roll adapted normally to project outwardly beyond the periphery of said one roll and to resiliently contact a work piece at said work station, said spring means being positioned adjacent the leading edge of said recess means on said one roll, a relatively fixed control element extending to a point near said work station and being spaced from the periphery of said one roll by a distance less than the outwardly projecting portion of said spring means, said rolls being disposed relative to each other so that the recess means of said other roll is adjacent said working station when

said spring means is leaving the range of said control element.

References Cited in the file of this patent

UNITED STATES PATENTS

96,372 Wiggernhorn ----- Nov. 2, 1869

1,107,621
1,403,525
1,946,735
2,342,817
2,358,269
2,632,345

5

Landis ----- Aug. 18, 1914
Sheppard ----- Jan. 17, 1922
Frayer ----- Feb. 13, 1934
Plagemann ----- Feb. 29, 1944
Wemhoner ----- Sept. 12, 1944
Hopkins ----- Mar. 24, 1953