A. C. VEITH.

AUTOMATIC LATHE.

APPLICATION FILED SEPT. 21, 1912.

1,146,374.

Patented July 13, 1915.

6 SHEETS—SHEET 1.

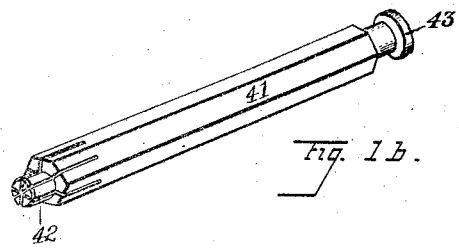


Fig. 1b.

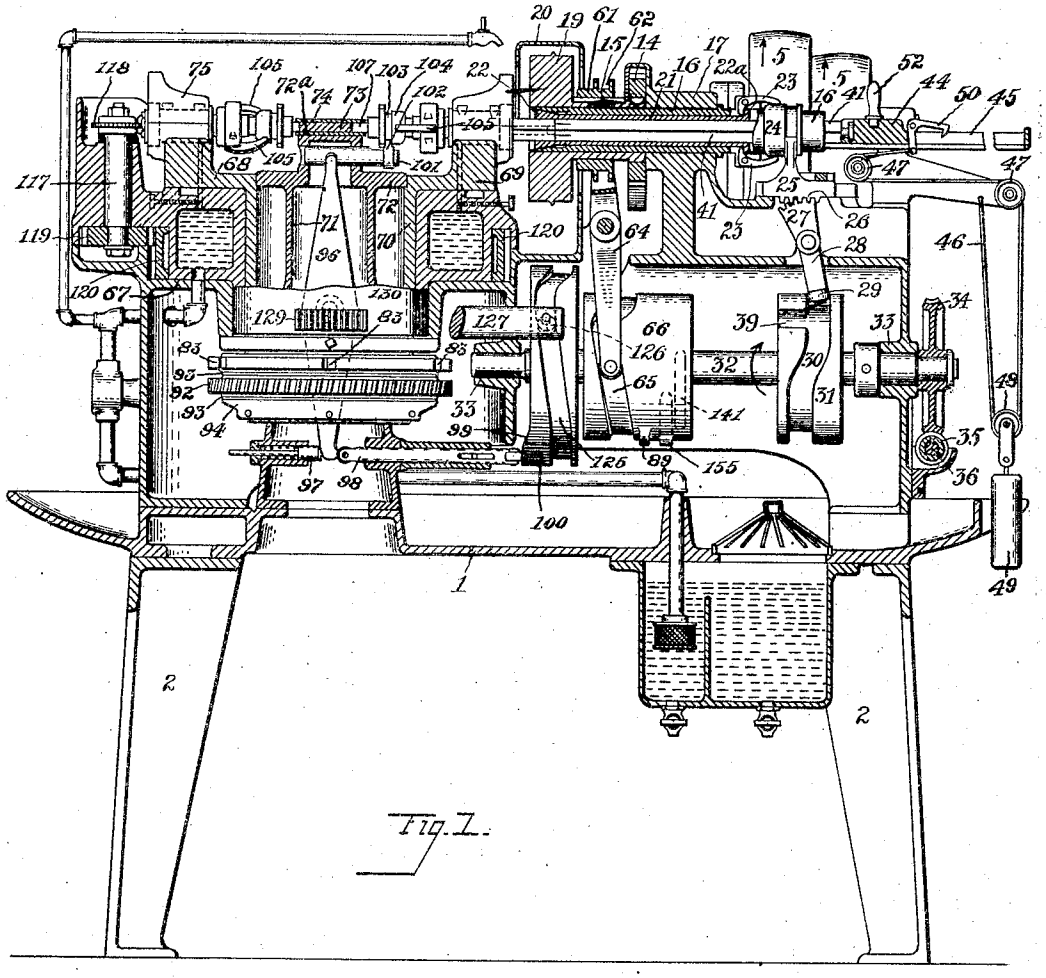


Fig. 7.

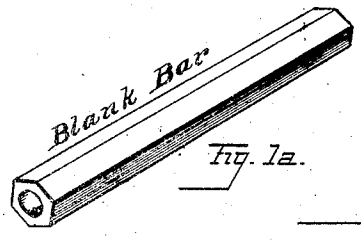


Fig. 1a.

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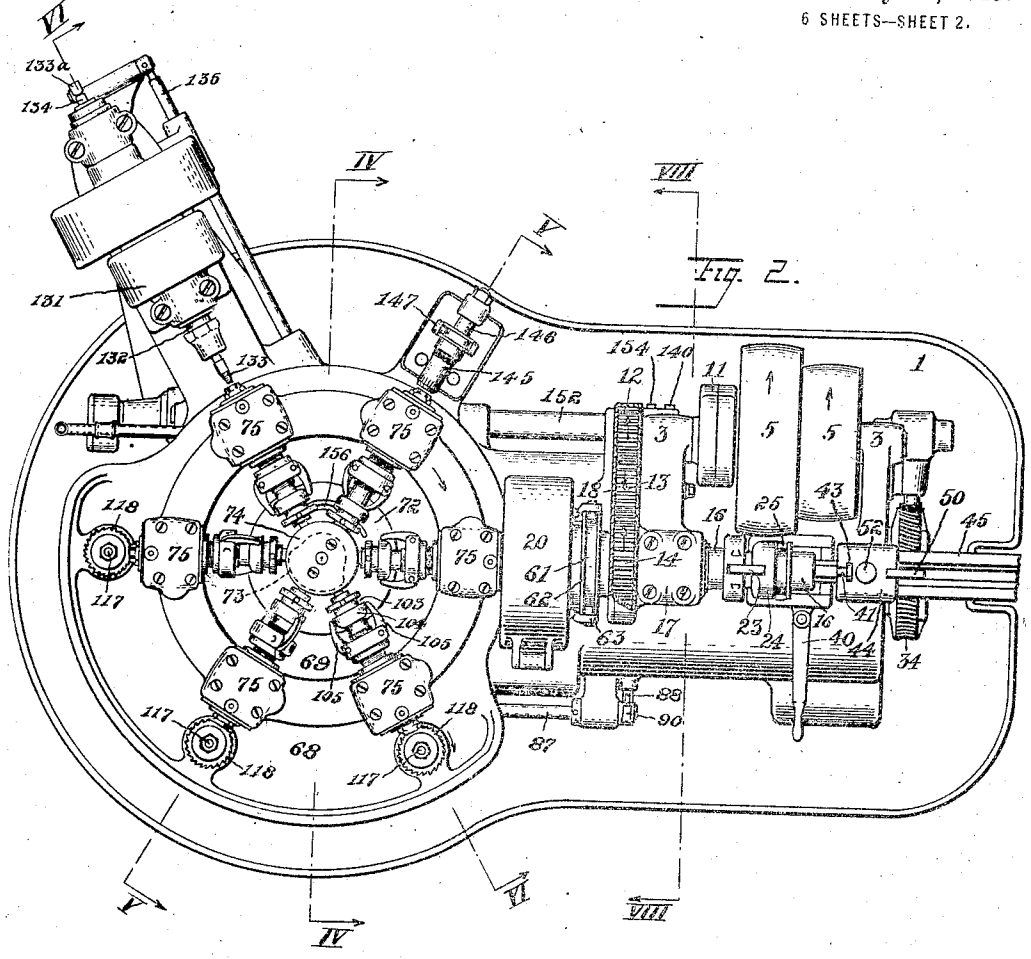


Fig. 2.

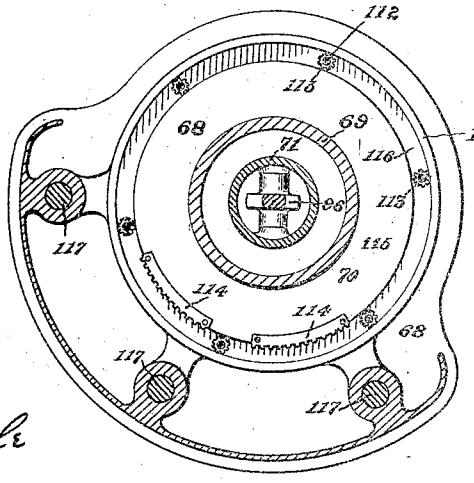


Fig. 3.

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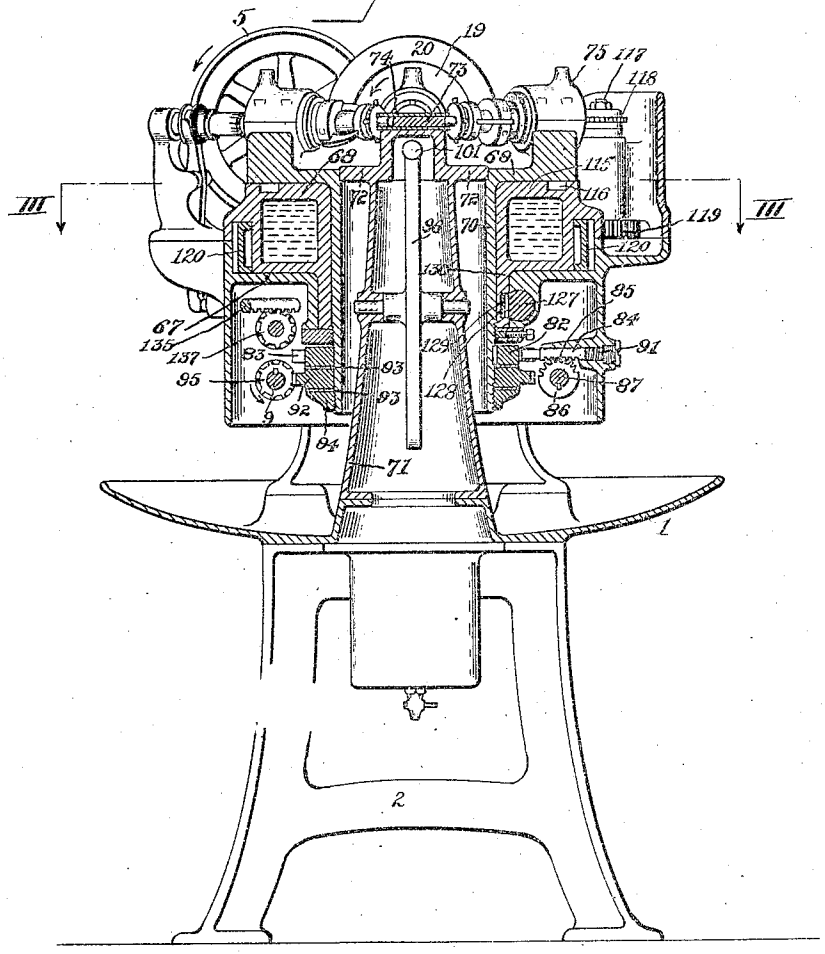
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6 SHEETS—SHEET 3.

Fig. 4.



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6 SHEETS—SHEET 4.

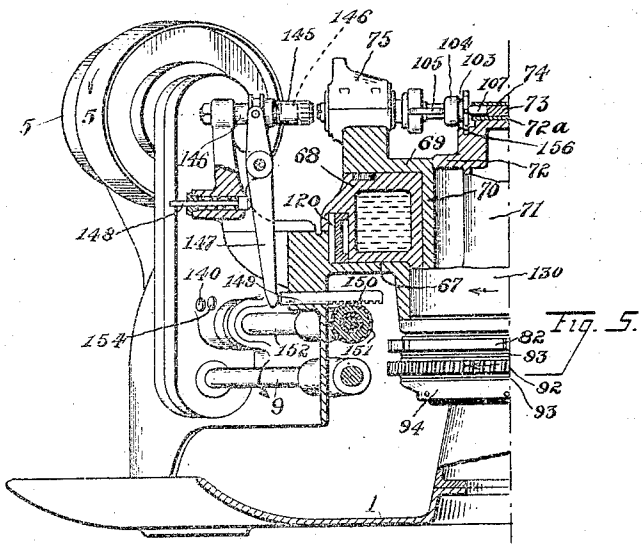


Fig. 5.

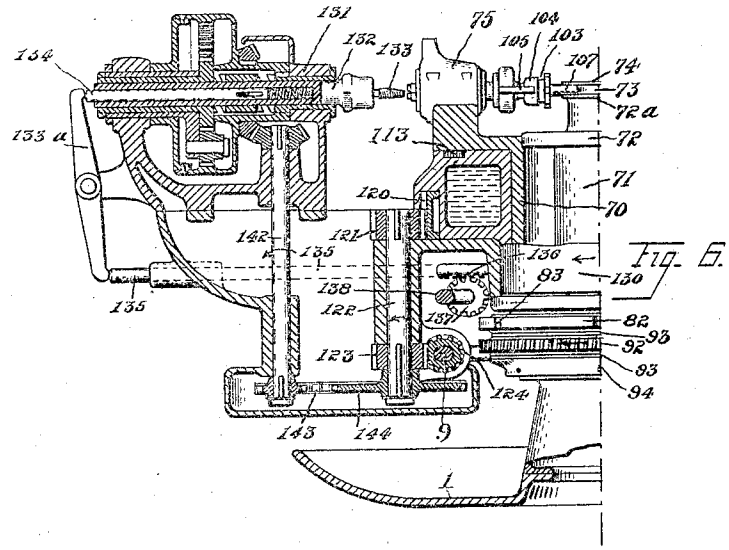


Fig. 6.

Witnesses

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6 SHEETS—SHEET 5.

Fig. 7

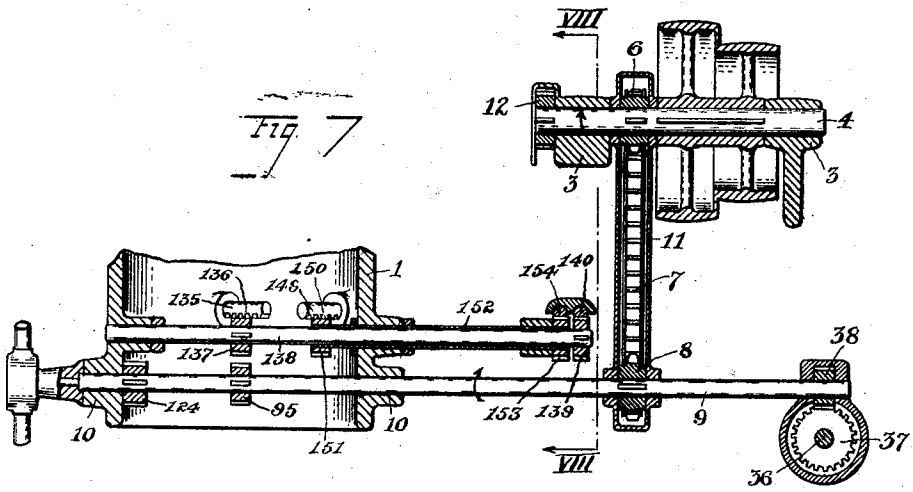
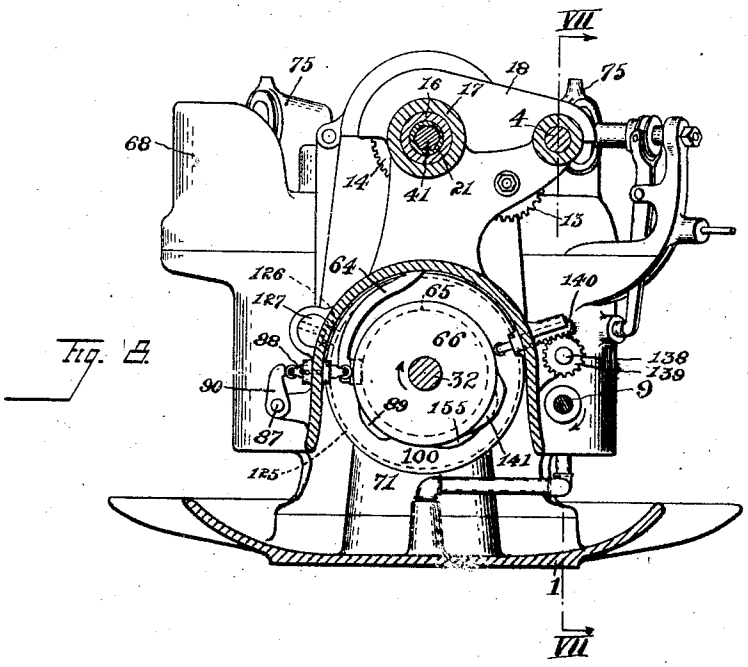


Fig. 8.



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6 SHEETS—SHEET 6.

Fig. 9.

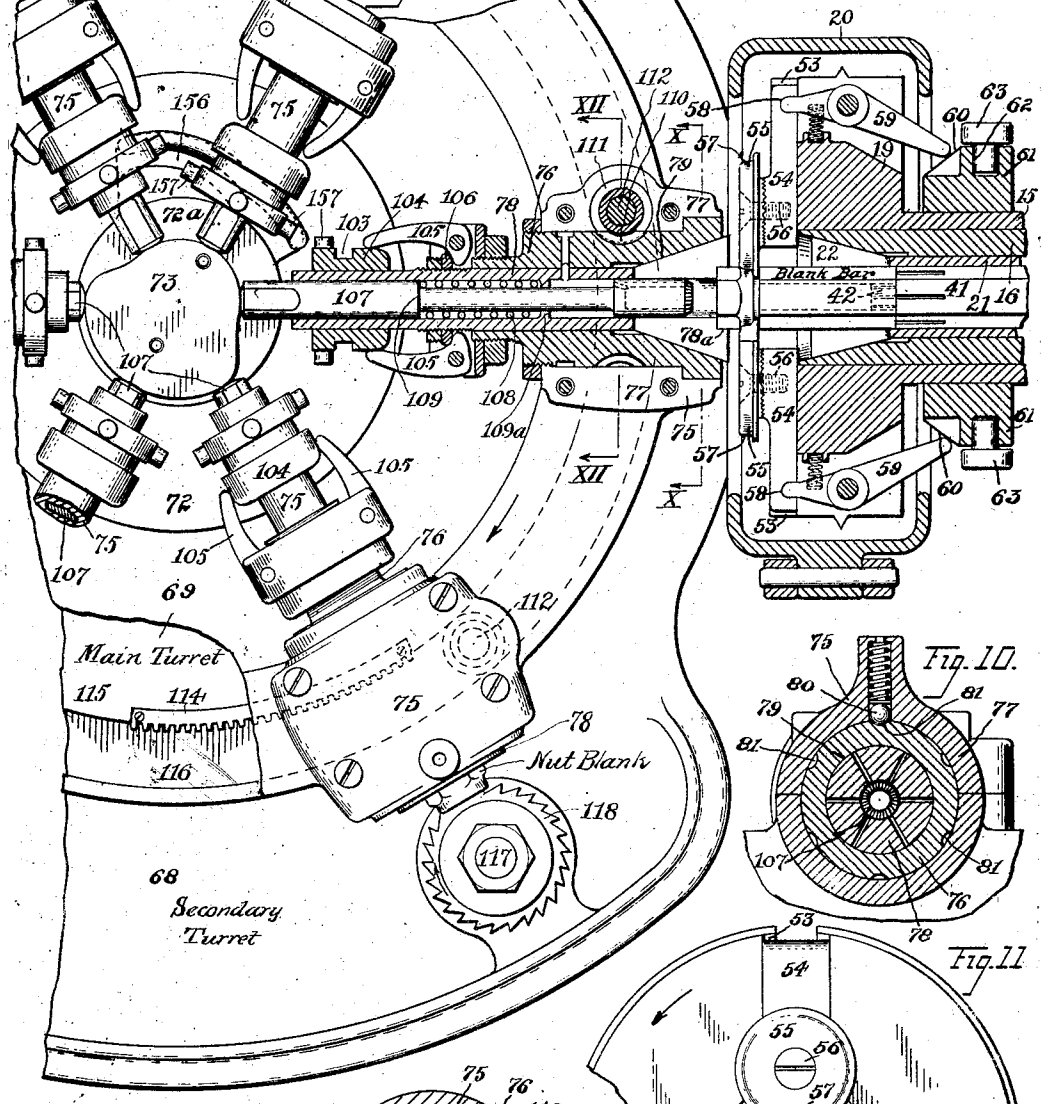


Fig. 10.

Fig. 11

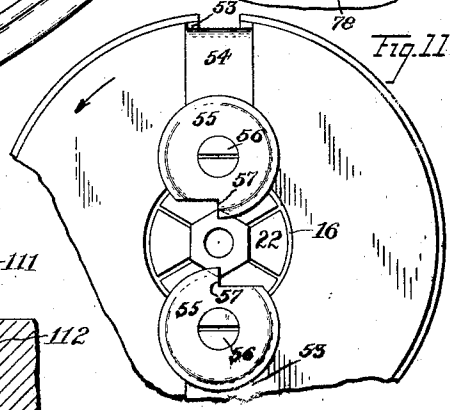


Fig. 13.

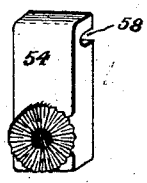
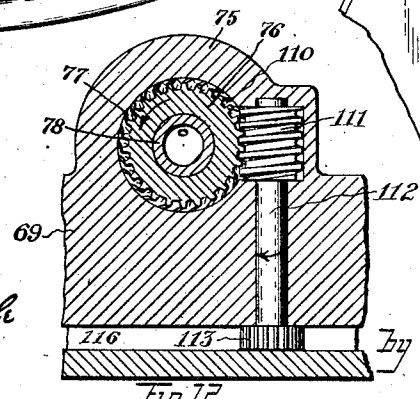


Fig. 12.



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AUTOMATIC LATHE.

1,146,374. Specification of Letters Patent. Patented July 13, 1915.

Application filed September 21, 1912. Serial No. 721,637.

To all whom it may concern:

Be it known that I, ALFRED C. VEITH, a resident of Pontiac, county of Oakland, and State of Michigan, have invented a new and useful Improvement in Automatic Lathes, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

My invention relates to automatic latches, its object being to provide such a lathe which will be economical in its construction and efficient in its operation.

A specific object of the invention is to provide an automatic lathe which will economically produce what are known as "castle" or "castellated" nuts.

My said invention consists of means hereinafter fully described and particularly set forth in the claims.

The annexed drawings and the following description set forth in detail certain means embodying my invention, the disclosed means however constituting but one of various mechanical forms in which the principle of my invention may be employed.

In the said annexed drawings, which illustrate my invention as embodied in a machine especially adapted to the manufacture of castle-nuts: Figure 1 represents a longitudinal vertical and axial section of such an automatic lathe. Fig. 1ª represents a perspective view of a section of bar-stock or blank-bar used in the device. Fig. 1ᵇ represents a perspective view, on an enlarged scale, of the push-bar of the blank-bar feeding device. Fig. 2 represents a plan of said lathe. Fig. 3 represents a horizontal section taken upon the plane indicated by line III—III in Fig. 4 which latter figure represents a vertical transverse section taken upon the plane indicated by line IV—IV in Fig. 2. Fig. 5 represents a fragmentary vertical section taken upon the plane indicated by line V—V in Fig. 2. Fig. 6 represents a fragmentary vertical section taken upon the plane indicated by line VI—VI in Fig. 2. Fig. 7 represents a fragmentary vertical section taken upon the plane indicated by line VII—VII in Fig. 8, which latter represents a vertical transverse section taken upon the plane indicated by line VIII—VIII in Fig. 2. Fig. 9 represents a fragmentary plan, upon an enlarged scale, showing parts in horizontal section. Fig. 10 represents a detail section, upon the scale of Fig. 9, of one of the blank gripping devices. Fig. 11 represents an enlarged detail fragmentary end view of the cutting-off device. Fig. 12 represents an enlarged detail vertical section taken upon the plane indicated by line XII—XII in Fig. 9. Fig. 13 represents a perspective view of a detail part of the cutting-off device.

In the form of my invention illustrated by the drawings, a main frame 1 is provided, supported upon suitable legs 2, upon which are mounted the various parts of the mechanism, hereinafter described.

Mounted in suitable bearings 3, 3, Figs. 2 and 7, is a main driving shaft 4 upon which are keyed two driving pulleys 5, 5. Upon this shaft is secured a sprocket-wheel 6 over which passes a sprocket-chain 7 which drives a second sprocket-wheel 8 fixed to a secondary driving-shaft 9 mounted on suitable bearings 10, 10, on the frame. A suitable housing 11 is provided for incasing said sprocket-wheels and chain, as clearly shown in Figs. 2 and 7.

At the inner end of shaft 4 is secured a pinion 12, Fig. 2, meshing with an idle pinion 13 which drives a gear 14 which is keyed to a rotatable sleeve 15, Fig. 1. This sleeve is mounted upon a hollow journal-member 16 which is fixedly secured in a box 17. The pinions 12, 13, and gear 14 are suitably incased in a housing 18, Fig. 2. The inner end of sleeve 15 is formed with an enlarged portion 19 through which the bore of sleeve 15 projects, and which is incased in a housing 20, Figs. 1 and 9. The inner end of journal-member 16 projects into the portion 19 as shown in said figures, and has the end of its bore formed with an outwardly diverging conical surface. The remainder of such bore is occupied by a collet-sleeve 21 which is movable therein longitudinally but rotatively fixed by means of a suitable key and key-way, (not shown) as will be understood. The inner end of collet-sleeve 21 is formed with an outwardly diverging frusto-conical portion or collet 22 which fits in the conical bore-portion of member 16 and is split longitudinally so as to render it slightly contractible, and capable of expansion after contraction as a result of its own elasticity. It will hence be seen that an endwise movement of sleeve 21

may be caused to effect the alternate contraction and expansion of the collet.

The bore of sleeve 21 is made hexagonal in cross-section and of dimensions such as will receive hexagonal bar-stock from which the blanks are cut for making the nuts, and permit such bar to readily slide therethrough while being practically held against movement about its axis. Such endwise movement of the collet-sleeve will therefore effect the alternate gripping and releasing of a bar of stock or blank-bar when the latter is lying in the sleeve with its end projecting from the inner end thereof, in a manner heretofore well known to those skilled in the art. For the purpose of effecting such endwise movement, the collet-sleeve is formed at its outer end with a collar 22^a which is engaged by two fingers 23, 23, Fig. 1, actuated by a hollow cone 24 movable in the direction of the sleeve's axis and mounted upon member 16. This cone is engaged by a sliding member 25, formed with a rack 26 upon its lower surface, engaged by a segment 27 formed on one arm of an oscillatory lever 28 whose other arm carries an anti-friction roller 29 traveling in a cam-groove 30 formed upon a cam-drum 31. This drum is fixed upon a shaft 32 mounted in suitable bearings 33, 33, formed on the frame and has fixed to its outer end a worm-wheel 34 driven by a worm 35 which is fixed to a transverse shaft 36 suitably mounted in the frame. This shaft 36 has secured to it a spiral gear 37 which is driven by a spiral pinion 38 mounted upon the end of the secondary driving-shaft 9, Fig. 7.

For the purpose of readily dismounting the parts, I provide a transverse groove 39 communicating with the cam-groove 30 and intersecting the one face of the drum, so that by turning the drum until roller 29 is opposite groove 39, the lever 28 may be swung so as to cause said roller to discharge the drum. This disengaging movement is effected by means of a lever 40 mounted upon the frame, Fig. 2. and engaging the sliding member 25

For feeding the hollow hexagonal blank-bar through the collet-sleeve, I provide a feeding or push-bar 41, Fig. 1^b, of hexagonal cross-section, snugly fitting the hexagonal bore of the said sleeve and freely sliding therein. The inner end of this bar is split so as to be contractible and is formed with a reduced portion 42 having its extremity slightly chamfered and of a diameter such that with slight contraction, such portion may be caused to enter the bore of the blank-bar and thereby be detachably secured to the latter

The outer end of the push-bar is formed with a collar 43 which detachably engages a sliding carriage 44, Fig. 1, which travels in an extended slide-way 45. This carriage has attached to it one end of a cord 46 which travels over pulleys 47, 47, and has its other end attached to the frame 1. In a bight of this cord is a pulley 48 to which is attached a suitable weight 49. This weight, therefore, tends to fall and to push the carriage 44 toward the collet-sleeve, move the push-bar through the latter and likewise push a blank-bar attached to the end of such bar. In order to render, when desired, the weight 49 inoperative, a latch 50 is mounted upon the carriage which may be manually caused to engage the end of the slide-way 45 and thus hold the said carriage in a stationary position. To facilitate the movement of said carriage to the end of the slide-way in the last described operation, a handle 52 is provided, as shown.

The mechanism thus far described constitutes the feeding-mechanism of the lathe and operates as follows: Assuming no blank-bar to be in the feeding device, the carriage 44 is pulled back and rendered inoperative as above described and the push-bar 41 withdrawn from the collet-sleeve. The blank-bar, having been previously cut to a suitable length, is now laid in the slide-way and pushed into and entirely through the collet-sleeve 21 until it strikes a stop (hereinafter described) which permits the required portion of the bar to project from the sleeve 15 for the cutting-off operation. The push-bar is now laid in the slide-way and its inner end caused to engage, as previously described, the outer end of the blank-bar. The carriage 44 is then released and the outer end of the push-bar caused to engage same. The machine now being operated, the cam drum 31 periodically effects, through the medium of the described parts, the alternate clamping and release of the blank-bar. During the periods of clamping, the cutting-off operation takes place as will be hereinafter described, and during the subsequent periods of release, the carriage and attached push-bar, moves the blank-bar inwardly against the stop, so as to place such bar in readiness for the next cutting-off operation. By providing a push-bar passing through the collet it will be seen that the entire blank-bar may be used up with the exception of a small end portion thereof, the length of said push-bar being such as to push the blank-bar a distance such as to reduce this remaining end portion to a minimum, as will be understood by those skilled in the art. When such point in the operation has been reached, the push-bar and attached stub of the blank-bar may then be withdrawn from the collet-sleeve and such stub-end thereby readily removed.

For cutting-off the blanks from the blank-

bar and partially forming the completed nut, I provide the following means: The inner face of the enlarged portion 19 of sleeve 15, Figs. 9 and 11, is provided with two radial under cut grooves 53, 53, in which are slidably mounted carriers 54, 54. These carriers have detachably secured thereto, the cutters 55, 55, which are circular in form and which may be adjusted about their axes. For such adjusting purposes, the adjacent faces of the carriers and cutters are radially serrated and secured to each other by means of centrally located screws 56, 56, Fig. 13. By these means the cutting edge 57 may, after wearing, be ground to assume a radial position, which, as will be understood, is to be desired. The back of each carrier is formed with a groove 58 engaged by one arm of a lever 59 pivoted on portion 19, the other arms of which are engaged by inclined surfaces 60 formed upon a reciprocable member 61 slidably mounted but rotatively fixed on sleeve 15. This member 61 is provided with a groove 62 engaged by a yoke 63 fixed to one end of a lever 64 pivoted upon the frame 1, and having its other arm engaged by a cam-groove 65 formed upon a cam-drum 66 fixed to the previously mentioned shaft 32. This cam-drum, therefore, reciprocates the member 61, during one stroke of which reciprocation the cutters travel inwardly a distance sufficient to cut off the blank nut. The cutting edges 57 are preferably formed so that in addition to cutting off the blank, the latter will have its end reduced or chamfered to assume the form customarily given to the outer ends of castle-nuts.

The main frame is formed with a horizontal annular bearing surface 67, Figs. 1 and 4, upon which is seated a secondary turret 68 of general annular construction and whose upper horizontal surface forms an annular bearing for an annular primary turret 69, said two turrets having coinciding axes at right angles to the axis of the feeding-mechanism or at right angles to the direction of feed of the blank-bar. Said primary turret is provided with a downwardly extending hollow sleeve 70 through which extends an upright hollow portion 71 of the main-frame preferably formed with a circular disk 72 closing the circular central opening of the primary turret. The top of the frame-portion 71 carries a horizontal fixed bearing or friction plate 72ª, Fig. 9, in which is secured a horizontal cam 73 to whose upper surface is secured a second bearing or friction-plate 74. The said plates form a groove adjacent to the periphery of cam 73 as shown in Figs. 1 and 4.

The primary or main turret 69 carries six equi-distant clamping or nut-holding devices 75, each identical in construction and operation with the others and similarly placed with reference to the center of a horizontal circle having its center lying in the turret's axis. Each such device comprises a main cylindrical member or sleeve 76 having its axis horizontal and intersecting the turret's axis, rotatably mounted in bearing 77 fixed to or forming part of the main turret structure. This sleeve 76 has slidably mounted in its bore a collet-sleeve 78 similar to collet-sleeve 21, whose frusto-conical split end engages a similarly formed interior surface 79 of member 76 as shown in Fig. 9. The outer end of sleeve 78 is formed with a hexagonal seat 78ª in horizontal alinement with the blank-bar when the latter is seated in the feeding device and has its sides in exactly the same planes respectively with the sides of such bar when so seated. This relation of the said seat and blank-bar is obtained by the use of a spring-actuated ball 80, Fig. 10, adapted to engage notches 81 formed in the periphery of the member 76 and distant from each other exactly sixty degrees. The horizontal alinement or coaxiality of said seats and bar is obtained through the medium of a ring 82 secured to the hollow sleeve 70 and formed with six equidistant notches 83 in its periphery. These notches are adapted to be engaged by a reciprocable locking-bar 84, Fig. 4, formed with a rack 85 engaged by a segmental gear 86 mounted upon an oscillatory shaft 87. One oscillatory stroke of said shaft is imparted by a plunger 88, Fig. 8, actuated by a projection 89 on cam-drum 66, Fig. 1, the outer end of said plunger engaging an arm 90 secured to said shaft 87. The other oscillatory stroke is effected by means of a suitable coil-spring 91, Fig. 4, bearing against the end of bar 84, as will be readily understood. Loosely mounted upon the sleeve 70 is an annular driving spiral gear 92, Fig. 4, which carries two friction rings 93 of fiber, the upper of which engages ring 82 and is so held by means of an annular ring 94 threaded upon the lower end of said sleeve as shown.

The gear 92 is in engagement with a spiral pinion 95 mounted upon the secondary driving-shaft 9, which is continuously driven in the direction indicated by the arrow in Fig. 8, when the machine is in operation. The gear 92 is therefore also continuously driven. It will hence be seen that whenever the bar 84 disengages a notch 83 the main turret is unlocked and is rotated in the direction of said arrow, as a result of the frictional engagement of gear 92, until the said bar is again caused to engage another notch 83. The movements of the parts are so timed that such locking and unlocking takes place once for each sixth part of a revolution of the said main turret, that is one such locking and unlocking operation takes place for each complete revolution of the cam-drum

66 and the relation of pinion 95 and gear 92 is such that one sixth of a revolution of said turret will take place during the period in which said turret is unlocked. It will now be seen that the succeeding clamping or holding devices are intermittently carried to a position of alinement with the blank-bar at intervals equal to the time of one complete revolution of the cam-drum 66 and hence of shaft 32 and held in such position. A feeding operation in which the said bar is moved forward also takes place in each such period, as will be understood, as well as a cutting-off operation. Each such feeding operation therefore causes the inner end of the blank-bar to enter the blank-seat 78ª of the adjacent clamping device, and the inner end of such seat acts as a stop for arresting the feeding movement

Oscillatorily mounted in the portion 71 of the frame is an oscillatory lever 96, Figs. 1 and 4, whose lower end is engaged on the one side by a spring-actuated plunger 97 and upon the other side by a reciprocable rod 98 engaged and actuated by a cam-face 99 formed upon a cam-drum 100 also mounted upon the shaft 32. The upper end of lever 96 engages and actuates a reciprocable horizontally mounted bar 101 which carries a yoke 102 engaging a groove 103 formed in a sliding cone 104 mounted upon the collet-sleeve 78, Fig. 9. This cone engages two pivoted fingers 105, 105, which are mounted upon the member 76 and engages a collar 106 secured to said collet-sleeve. It will therefore be seen that the rotation of drum 100 will effect the reciprocation of the collet-sleeve and hence the alternate opening and closing of the blank-seat 78ª formed in its end. The cam-face 99 is so located that such closing operation will take place immediately after the end of the blank-bar is caused to enter the seat

Seated in the bore of each sleeve 78 is the stem of reciprocable reamers 107 whose cutting head has a path of travel intersecting the seat 78ª. The inner end of such stem is flattened at the top and bottom so as to fit between the plates 72ª and 74 which thus hold the reamer against rotation. The said inner stem-end is furthermore held in frictional engagement with the cam 73 by means of a coil-spring 108 bearing against a shoulder 109 formed on said stem, and an annular flange 109ª formed on the interior of the sleeve 78, as shown in Fig. 9. The cam 73 is so located that the head of each reamer is withdrawn from the respective seat 78ª at the time the latter is opposite the feeding device.

The exterior of each member 76 is formed with worm-wheel teeth 110 which are engaged by a worm 111 mounted upon a short vertical shaft 112, Fig. 12. The lower end of each of these shafts carries a pinion 113, the path of revolution of whose teeth about the turret axis is intersected by two gear segments 114, Fig. 3, secured to the portion 115 of the secondary turret, the latter being formed with a groove 116 in which said pinions travel, as shown in Figs. 3 and 4. It will therefore be seen that rotation of pinions 113 will effect the rotation of members 76. The segments 114 are of a length such that they will each impart to said pinions a rotative movement sufficient to rotate the members 76 through exactly one sixth of a revolution. The secondary turret 68 has mounted in it three vertical spindles 117 whose axes intersect the circumference of a circle at points sixty degrees apart. The upper end of each such spindle carries a circular saw 118, Figs. 2 and 4, and the lower end carries a pinion 119. These pinions all engage an annular gear-wheel 120 which is mounted upon the outer cylindrical surface of the said turret as a journal, as clearly shown in Fig. 1. Said gear-wheel meshes with a pinion 121, Fig. 6, which is mounted upon the upper end of a spindle 122 whose lower end carries a spiral gear 123 meshing with a spiral pinion 124 (see also Fig. 7) secured to the secondary driving shaft 9. It will thus be seen that the saws are driven continuously. These saws are so located that they intersect the path of revolution of nut-blanks held in the gripping devices.

An oscillatory movement is imparted to the secondary turret during the operation of the machine through the medium of the cam-drum 100. This drum is formed with a cam-groove 125 which engages a roller 126, Fig. 1, mounted upon a reciprocable bar 127 having a rack 128 formed upon it, as shown in Fig. 4. This rack engages a gear-segment 129 secured to the downwardly projecting sleeve 130 of the secondary turret. The throw of the cam-groove is made sufficient to cause the saws to travel entirely across the face of the nut blanks held in the gripping devices.

As thus far described the machine operates as follows: A blank bar having been placed in the feeding device as described, whereby the inner end of such bar is introduced into the gripping seat of one of the gripping devices, and the pulleys 5 being rotated, shafts 9 and 32 are also rotated along with the cam-drums 31, 66, and 100. The primary turret is locked by bar 84 and member 19 is rotating at a high speed, the blank-bar being held stationary. Cam face 99 now actuates the bar 98 to operate lever 96 to operate the cone 104 to cause the collet-sleeve 78 to contract and thus clamp the blank-bar end in the gripping seat. Meanwhile cam-drum 66 is operating to move lever 64 to cause the cutters 55 to move inwardly to perform the cutting-off operation, and cam-drum 31 to actuate, through the intermediate parts, as previously described,

the collet-sleeve 21 to clamp the bar in the feeding device. The cutting-off operation is thus performed with the blank bar securely held. Such operation having now been completed, locking bar 84 is withdrawn as a result of the engagement of projection 89 with the plunger 88 and the consequent actuation of the gear segment 86. This allows the primary turret 69 to rotate sixty degrees while the nut-blank is still securely clamped in the gripping seat. At the same time, cutters 55 are being retracted and collet-sleeve 21 loosened by the action of cam-drum 31 so as to allow the blank-bar to be pushed inwardly to have its end inserted in the gripping seat of the next gripping device on the primary turret, whereupon the above described operations are repeated. In the meantime, however, the nut-blank just formed has reached a position of rest sixty degrees distant from its starting point and immediately thereupon, cam-drum actuates bar 127 to impart one oscillating stroke to the secondary turret and so cause the first saw to pass across the nut's face to form the first groove. Upon the next partial rotation of the primary turret, the nut so cut is carried to the next saw, but during such travel, the corresponding pinion 113 engages the first segment 114, and as a result the member 76 together with the nut-blank is rotated through an angle of sixty degrees. While this is occurring, the inner end of reamer 107 is engaged by cam 73 and the reamer thus pushed outwardly and into the end of the bore of the nut-blank. The reamer being held, as before described, against rotation, and the nut-blank rotating, a partial reaming operation will take place as the blank travels from the first to the second saw. The primary turret having traveled another sixty degrees now comes to rest and the second saw is caused to form a second groove at an angle of sixty degrees to the first-formed groove. During such time, it will be observed, a third nut-blank is being cut off and the first groove is also being formed in the second-formed blank. Upon the next movement of the primary turret, the gripping device holding the first-formed nut-blank is again rotated sixty degrees, a further reaming operation is effected and a third groove formed in exactly the previously described manner, while a fourth blank is being cut off, the first groove is being cut in the third-formed blank, and the second groove-cutting and first reaming operation is being performed on the second-formed blank.

Located so as to have its field of operation sixty degrees from the field of operation of the last saw, and mounted upon the main frame, is a nut-tapping device 131, Figs. 2 and 6. This device may be of any suitable or well-known construction, the details of which form no part of my present invention. As shown, however, it consists of a hollow spindle 132 carrying a chuck for holding the tap 133. This tapping mechanism is so arranged that the spindle 132 is pushed forward periodically and as a blank-nut is brought to rest opposite it, and caused to enter the end opposite the reamed end of the nut's bore. After the tap has passed completely through such bore, the mechanism reverses itself automatically to withdraw the tap before the next turret movement takes place. To effect the forward movement of the spindle 132, a lever 133^a is mounted on the frame as shown in Fig. 6, having its upper end engaging the outer end of a rod 134 seated in said spindle, and its lower end engaged by a reciprocable rod 135, having a rack 136 formed thereon. Said rack meshes with a spiral pinion 137 mounted upon a rock-shaft 138. Said shaft has secured to it a pinion 139, Figs. 7 and 8, which is engaged by a rack-bar 140 arranged to be periodically actuated by a cam 141 formed in the cam-drum 66. The rotation of the spindle 132 is effected through the medium of an upright spindle 142 and intermediate detail parts. Said spindle 142 is driven by a chain 143 itself driven by a sprocket-wheel 144 mounted upon the lower end of spindle 122, Fig. 6. Sixty degrees from the tapping device is an extracting and ejecting device. The latter comprises a horizontally reciprocable tube 145 having its inner end split, as shown in Fig. 5, and adapted to slip over the end of a nut while held in a gripping-device. This tube slides upon a fixed ejector-rod which passes into its bore. A lever 147 is mounted on the frame and has its upper end engaging the said extrector-tube, the lower arm of which is engaged by a spring-actuated plunger 148 tending to draw the tube outwardly. The lower end of said lever is engaged by a reciprocable bar 149 formed with a rack 150 engaging a spiral gear 151. The latter is fixed to a sleeve 152 rotatably mounted upon the afore-mentioned rock-shaft 138, Fig. 7. The outer end of said sleeve has fixed to it a pinion 153 engaged by a rack-bar 154 which is actuated by a second cam on cam-drum 66. Each revolution of the latter, therefore, causes the extractor tube to move inwardly, surround and grip the finished nut and then return carrying with it such nut. On the return movement the rod 146 ejects the nut from the tube, as will be understood. Before the extraction of the nut takes place, as above described, the cam face 99 operates to permit lever 96 and the connected parts to move so as to actuate the collet-sleeve to release the nut so held. In order to permit the collet-sleeve to so act however, it is necessary to positively move the cone 104 so as to release the fingers 105. This is accompliished by providing a

cam-groove 156, Fig. 9, which at the proper time engages a projection 157 formed on said cone, whereby such required movement is effected. This groove terminates as shown, at a point such as will allow the cone to be again moved to effect a locking operation immediately after the end of the blank-bar has been inserted in the seat from which a nut has just previously been removed. In this manner, it will be observed, that the blanks are cut, sawed, tapped and ejected, and that all of the tools are operated simultaneously, thereby reducing the time for completing a nut to a minimum.

Having fully described my invention, what I claim and desire to secure by Letters Patent is:

1. In an automatic lathe, the combination of non-rotatable means for feeding a blank-bar in the direction of its axis; a revolving cutter having its field of cutting operation adjacent to the end of said means and having its axis coinciding with the axis of the latter; and means for automatically reciprocating said cutter radially with reference to its axis.

2. In an automatic lathe, the combination of a tubular member whose bore forms a slide-way for a blank-bar; and having a conical, contractible end-portion; means in which said member is slidable and adapted to effect the contraction and permit of the expansion of said end-portion; and a rotatable cutter mounted upon said means as a journal and having a central opening registering with said bore.

3. In an automatic lathe, the combination of a turret; a rotatable gripping device mounted on the latter and having a radially disposed bore; a non-rotatable cutting tool slidably mounted in said bore and having a path of movement intersecting the blank-seat of said gripping device; means tending to retract said tool from said seat; a stationary cam engaging the inner end of said tool; and means for rotating said gripping device.

4. In an automatic lathe, the combination of a turret; a rotatable gripping device mounted thereon and having a radially disposed bore; a non-rotatable reamer slidably mounted in said bore and having a path of movement intersecting the blank-seat of the gripping device; means tending to retract said reamer from such seat; a stationary cam engaging the inner end of said reamer; and means for rotating said gripping device.

5. In an automatic lathe, the combination of a turret; a rotatable gripping device mounted thereon and having a radial bore; a non-rotatable cutting tool slidably mounted in said bore and having a path of operation intersecting the blank-seat of the gripping device; means tending to retract said cutting tool from said seat; a stationary cam engaging the inner end of said cutting tool; and means for intermittently and partially rotating said gripping device.

6. In an automatic lathe, the combination of a turret; a rotatable gripping device mounted thereon and having a radial bore; a non-rotatable reamer slidably mounted in said bore and having a path of operation intersecting the blank-seat of the gripping device; means tending to retract said reamer from said seat; a stationary cam engaging the inner end of said reamer; and means for intermittently and partially rotating said gripping device.

7. In an automatic lathe, the combination of a turret; means for intermittently and partially rotating same upon its axis; a gripping device mounted radially and rotatably upon said turret; a plurality of cutting tools mounted upon a secondary turret and so as to have a field of operation intersected by a blank held in said gripping device, during the revolution of the latter about the turret's axis; means for rotating said turret; and means for effecting movement of said secondary turret.

8. In an automatic lathe, the combination of a turret; a gripping device mounted rotatably and radially thereon; a plurality of saws mounted so as to have field of operation intersected successively by a nut held in said gripping device, during the revolution of the latter about the turret's axis; means for periodically and partially rotating said turret; means for periodically and partially rotating said gripping device during the partial rotation of said turret.

9. In an automatic lathe, the combination of a turret; provided with a plurality of radially extending rotatable gripping devices; means for imparting to said turret a succession of partial-rotations of amplitude such as to bring the gripping devices successively to the same given position; three saws placed adjacent to the periphery of said turret; in succession in the direction of turret-rotation and mounted upon a secondary turret; means for partially rotating said gripping devices after leaving the first saw and before reaching the second; means for similarly rotating said device after leaving the second and before reaching the third saw, and means for periodically reciprocating said secondary turret.

10. In an automatic lathe, the combination of a turret; a plurality of gripping devices rotatably mounted thereon with their axes radially disposed with reference to the turret's axis and at right angles thereto; each such device having a rotating member formed with worm-wheel teeth; a worm engaging the latter and mounted upon a spindle carrying a pinion; and stationary racks lying at intervals in the path of revolution of said pinion.

11. In an automatic lathe, the combina-

tion of a main turret; a plurality of gripping devices rotatably mounted thereon with their axes radially disposed with reference to the turret's axis and at right angles thereto; a main frame in which such turret is mounted; a secondary turret on said main frame, surrounding said main turret, oscillatory on said main frame, and having its axis coinciding with the axis of the said main turret; a plurality of cutting tools having their axes parallel with the main turret axes, mounted upon said secondary turret, and having their field of operation intersected by the path of revolution of blanks held in such gripping devices; means for periodically and partially rotating the main turret; means for periodically effecting a gripping and releasing operation on the part of said gripping devices; and means for actuating said cutting tools.

12. In an automatic lathe, the combination of a main turret; a plurality of gripping devices rotatably mounted thereon with their axes radially disposed with reference to the turret's axis and at right angles thereto; a main frame in which said turret is mounted; a secondary turret on said main frame surrounding said main turret, oscillatory on said main frame and having its axis coinciding with the main turret's axis; a plurality of rotatable cutting tools having their axes parallel with the main turret's axis, mounted upon said secondary turret and having their fields of operation intersected by the path of revolution of blanks held in such gripping devices; means for periodically and partially rotating the main turret; means for periodically effecting a gripping and releasing operation on the part of said gripping devices; means for rotating said cutting tools; means for oscillating said secondary turret during such rotation; a tapping device mounted upon said main frame and having the tap's axis radially disposed with reference to the turret's axis; means for operating said tapping device periodically; an extractor for removing the finished nuts from the gripping device; and means for periodically operating said extractor.

Signed by me this 30th day of August, 1912.

ALFRED C. VEITH.

Attested by—
H. W. HOLMES,
ROBERT H. GRANT.