

(No Model.)

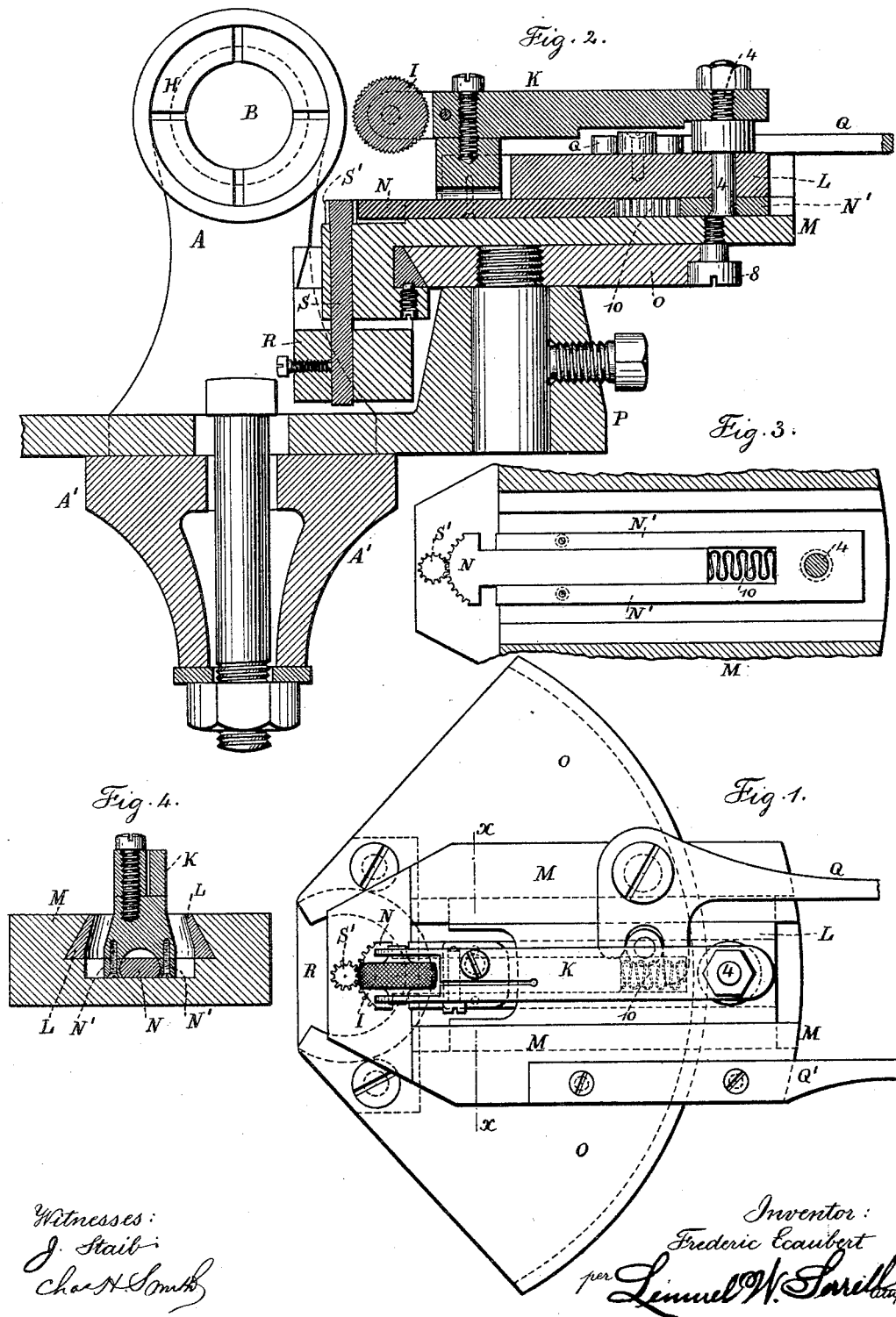
2 Sheets—Sheet 1.

F. ECAUBERT.

TOOL FOR ORNAMENTING WATCH CASE CENTERS OR OTHER ARTICLES.

No. 454,557.

Patented June 23, 1891.



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(No Model.)

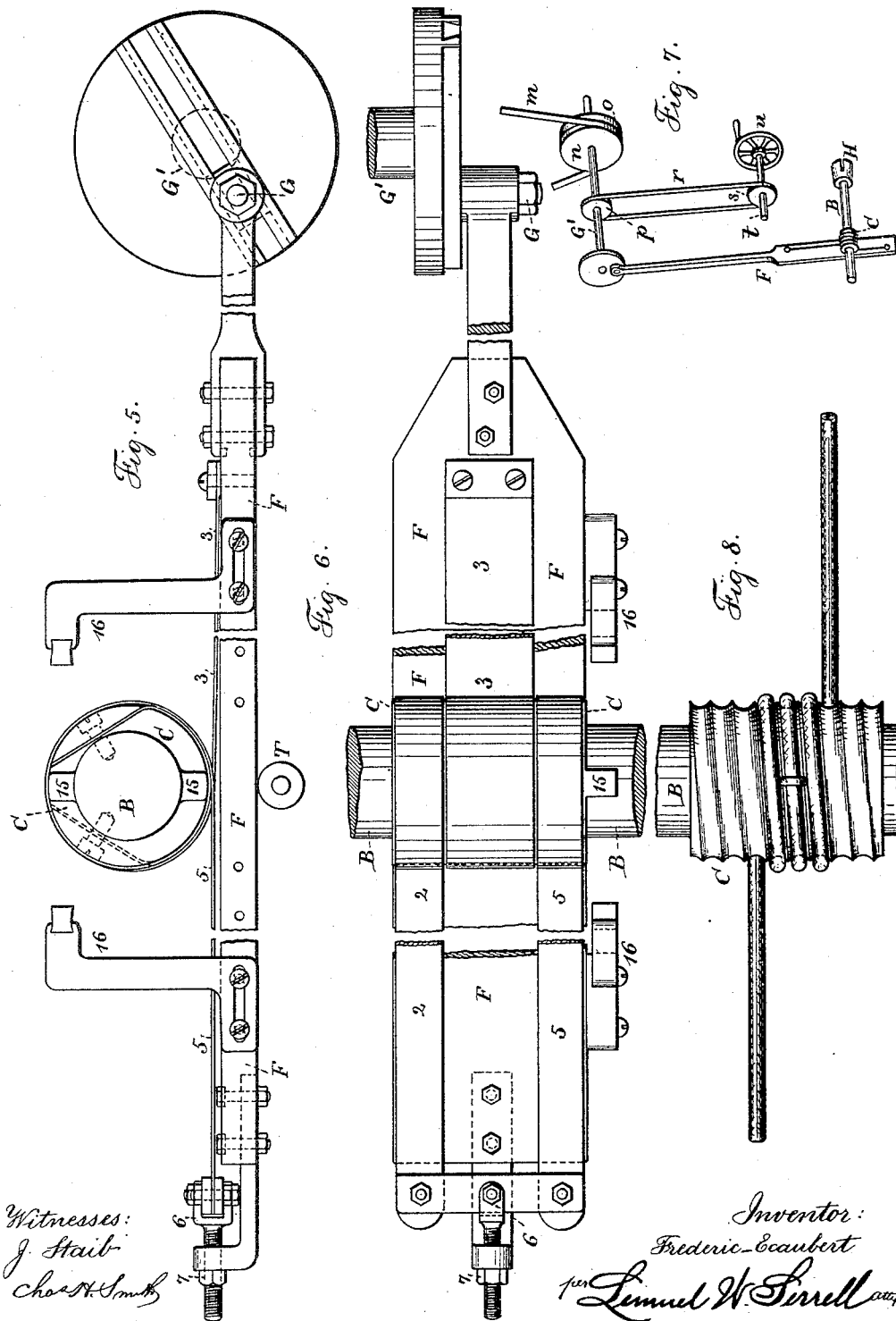
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UNITED STATES PATENT OFFICE.

FREDERIC ECAUBERT, OF BROOKLYN, NEW YORK.

TOOL FOR ORNAMENTING WATCH-CASE CENTERS OR OTHER ARTICLES.

SPECIFICATION forming part of Letters Patent No. 454,557, dated June 23, 1891.

Application filed November 13, 1890. Serial No. 371,300. (No model.)

To all whom it may concern:

Be it known that I, FREDERIC ECAUBERT, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented an Improvement in Tools for Ornamenting Watch-Case Centers or other Articles, of which the following is a specification.

The present invention is an improvement upon and modification of devices represented in my application, Serial No. 263,867, filed February 13, 1888. In that application a device is represented for holding the knurling-tool and allowing the same to receive a lateral motion as the knurling-tool is swung around in ornamenting convex watch-case centers or similar articles, and the lateral motion given to the holder for the knurling-tool is derived from a stationary pinion acting upon a rack that is connected to the holder of the knurling-tool; but in consequence of the backward and forward movement given to the knurling-tool and its holder the teeth of this rack are liable to become disconnected from the stationary pinion.

My present improvements relate to the means made use of for holding the teeth always in gear with each other and for allowing the necessary backward and forward movement to the knurling-tool.

In communicating to the mandrel and chuck or holder for the article to be ornamented, a reverse rotary movement, first in one direction and then in the other, a rack with gear-teeth has been made use of; but I have discovered that the same is noisy, the teeth become worn, and the rapid motion that is given to the parts causes such parts to wear loose with rapidity, and the perfection of the knurling or ornamenting operation is thereby lessened. To avoid these difficulties I make use of reverse-acting bands connected with the mandrel and receiving their motion from an adjustable crank-pin, so that the reverse rotary motion is given with great reliability and without noise or concussion.

In the drawings, Figure 1 is a plan view of the knurling-tool and its support. Fig. 2 is a section of the same. Fig. 3 is a detached view of the rack and base and the stationary pinion. Fig. 4 is a cross-section at the line *x*

x, Fig. 1. Fig. 5 is an elevation representing the adjustable crank-pin and connections to the mandrel and the stops. Fig. 6 is an elevation at right angles to Fig. 5 of the mandrel and connections and stops. Fig. 7 is a perspective diagram of the starting mechanism, and Fig. 8 is a modification of the device shown in Figs. 5 and 6.

The mandrel-head A is supported on any suitable bed A', and the mandrel B is received into the head A, and it is free to be rotated therein, as usual, and the holder or chuck H is adapted to receive the watch-case center, lid, or other article to be acted upon or ornamented.

The base or quadrant O is provided with a post that is received into and supported by the holder P, that is adjustable upon the bed-plate A' of the machine, as usual. The portion called the "quadrant" may be more or less than a quarter-circle plate, according to the extent of lateral movement to be given to the tool or knurl. Upon this quadrant O the slide-rest M is received, such slide-rest being provided with a downward projection that is received within the concave edge of the quadrant, and there is a screw S or lip connected with the slide-rest M and catching beneath the convex edge of the quadrant, so that such slide-rest may be swung upon the quadrant in the usual manner, and the surface of the rest M is grooved for the reception of the slide L, which slide L can be moved backward and forward by a bent lever Q, which is pivoted upon the slide-rest M and has a jaw acting upon a roller upon the slide L, and the grasping bar or lever Q' is made use of in moving the slide-rest M laterally, and it also enables the operator to apply the proper pressure to the knurling-tool in grasping the levers Q and Q' in one of his hands during the ornamenting operation.

Upon the slide L is a pivot 4 for the tool-holder K, which tool-holder has a jaw or fork at the end for the reception of the knurl or ornamenting-tool I, the surface of which is engraved or otherwise formed as the reverse of the ornament to be applied to the surface of the watch-case center or other article, and this ornament will usually pass entirely around the knurling-tool; but in cases where

the knurling-tool is larger than the article to be knurled or ornamented such engraving may only be partial upon this knurling-tool or circular die.

5 It will now be understood that the knurling-tool is to be brought in contact with the watch-case center or other article to be knurled, which article may receive a continuous rotary motion or a motion first in one direction
10 and then in the other, and under all circumstances the hand-lever Q is used to communicate to the slide L, pivot 4, and tool-holder K a movement toward the article acted upon, and the engraved or knurled surface of the
15 tool I, in contact with the article that is operated upon, partakes of the character of a gear by the projections from the tool indenting themselves into the metal acted upon, and the parts roll together and remain reliably in
20 contact not only when the knurling-tool is simply pressed forward by the action of the lever Q, but also during the time that the rest M is moved laterally upon the quadrant, and during this time the tool-holder K may
25 swing more or less upon the pivot 4, whereas if the tool-holder K were permanently connected to the slide-rest M the tool itself might slide laterally upon the surface of the article being ornamented in such a manner as to
30 produce imperfect work; but the tool-holder K, swinging upon the pivot 4, insures the proper undisturbed contact of the surface of the knurling-tool with the surface of the article being knurled. Hence where a reciprocating or reverse rotary motion is given to
35 the article being knurled the same projections upon the knurling-tool always enter the same recesses in the article being knurled during the entire operation until the
40 metal of the watch-case center or other article entirely fills the pattern upon the knurling-tool at the place of contact.

It is to be understood that in ornaments that are simple transverse or diagonal corrugations, such as known as the "Jurghensen" or "rope" ornaments, there is no special disadvantage to the work in consequence of any slight lateral movement or slip of the tool upon the article, because the surfaces are
50 smooth in this direction; but in the case of vermicelli patterns or other ornaments having lines of ornamentation running in different directions any lateral pressure against such ornaments tends to displace the metal
55 and produce imperfect work. The present invention has special reference to preventing this imperfection.

As an additional means for insuring the proper contact of the knurling-tool with the article being knurled a stationary pinion S' is provided, the same having a stem S passing through a central hole in the slide-rest M into the center of the block R of the quadrant O, where this stem S is firmly secured
60 by a set-screw or otherwise, and the shape of the pinion S' is to correspond, or nearly so, to the convexity of the watch-case center or

other article operated upon, and the parts are so adjusted with reference to the article operated upon that the axis of the pinion S', if
70 prolonged, would intersect and correspond to the center from which the convexity of the article operated upon was described at the place where the knurl acts upon such article, and there is a rack N, that is straight when
75 used with a cylindrical knurl or convex when used with a convex knurl or concave or other shape to correspond with the knurl, which rack N is in gear with the pinion S', and this rack N is connected with the tool-holder K
80 in any suitable manner. I have represented the rack N as between jaws or guides N', in which it is free to slide longitudinally and toward the pinion, and there is a spring 10 to press the rack toward the pinion, and this
85 jaw N' is permanently connected with the tool-holder K, preferably by a block that interposes between the under side of the tool-holder and the jaws or guides N', and these parts are secured together. Hence the tool-holder K can be drawn back a sufficient distance for separating the tool from the article
90 operated upon without separating the teeth of the rack N from the pinion S', because the spring 10 presses such rack N toward the pinion, and when the tool-holder K and tool I are
95 pressed toward the article operated upon the spring 10 is compressed, and under all circumstances the teeth of the rack N serve to guide the tool-holder and knurling-tool, as
100 these parts may be moved around laterally upon the quadrant during the knurling or ornamenting operation, the object being to maintain the tool-holder K perpendicular, or nearly so, to the convex surface of the article
105 operated upon.

It will be understood that this improvement is adapted to ornamenting watch-case centers or rings that are either flat, convex, or more or less irregular in sectional shape,
110 and also to ornamenting the lids of watch-cases, lockets, or other articles, in which latter instance the rolls made use of may be conical or conically curved, as represented in my patent, No. 434,539, granted August 19,
115 1890.

Upon the mandrel B is a pulley or cylindrical surface C, to which the rotating power is applied, and there is a counter-shaft G', having upon the same a disk or crank and adjustable crank-pin G, and from this as connecting-rod F extends, and I make use of
120 bands or strips of sheet metal, preferably of tempered steel, for connecting the rod F to the pulley C, and these bands are to pass in opposite directions around the pulley and are secured at their outer ends to the rod F in any suitable manner, so that when the rod F is moved in one direction one band is unrolled from the pulley and the other band
125 rolled upon the pulley, so as to give to such pulley and the mandrel a rotary movement first in one direction and then in the other, and it will be apparent that a strip or a wire

or a cord may take the place of the metal strips and be the equivalents of the same.

I prefer to make use of three steel strips 2 3 5, the strip 3 being wider than the strips 2 5 and 5 and the strip 3 represented as permanently fastened at its outer end by screws or otherwise to the rod F, and the strips 2 and 5 are connected at their ends to the rod F, preferably by a jaw 6 and tightening-nut 7.

The inner ends of the strips or bands are fastened in any suitable manner to the mandrel B, preferably by clamping-blocks and set-screws, the clamping-blocks being let in flush with the surface of the pulley C, as represented in Fig. 5, and the strips 2 and 5 pass around in one direction, while the strip 3 passes in the other direction, and by adjusting the crank-pin G a complete rotation can be given to the mandrel B first in one direction and then in the other, or the extent of the reverse rotary movement may be either less than a complete rotation or more than a complete rotation, and the rotary movement first in one direction and then in the other is given noiselessly, or nearly so. Any wear or looseness that may occur from time to time can be taken up by the nut 7. Hence the motion given to the mandrel is reliable and noiseless, or nearly so, and the knurling operations can be performed upon the article that is ornamented with great accuracy and stopped at any desired point with uniformity. In this reverse rotary motion the inertia of the mandrel and parts carried by it is advantageously checked by the use of elastic stops, which may be applied in any desired manner to act at the termination of the movement in first one direction and then the other.

I find it advantageous to place one or more stops 15 upon the mandrel and to employ two adjustable arms 16 upon the connecting-rod F, the ends of these arms 16 being provided with rubber or other yielding material, so as to prevent concussion when a stop 15 comes in contact with the end of either arm, and these arms are to be placed in such positions that the stops come in contact with them under the proper conditions of pressure at the moment the crank-pin G turns the dead-center, so that the inertia of the mandrel is checked by these elastic stops, and the expansion of the rubber or other surface of the stop serves to aid in starting the rotation of the mandrel in the opposite direction.

The advantages resulting from the construction and mode of operation hereinbefore described will be more clearly understood by supposing that the article to be operated was standing still and that the knurling-tool was brought up into contact with the surface and then swung laterally first to one side and then to the other, and the projections upon such knurling-tool would indent themselves into the surface of the metal, and because the holder for the tool swings upon the pivot 4 the knurling-tool is free to accommodate itself to the surface of the article being acted

upon; but if the holder of the knurling-tool was moved rigidly to the right or left the point of contact of the knurling-tool with the article operated upon might be carried bodily one way or the other and produce a scraping action upon the surface of the article, and this latter operation actually takes place to a greater or less extent in the ordinary mode of knurling. Hence it has not been possible to obtain perfect work when the knurling-tool has been mounted rigidly upon the ordinary quadrant having a lateral motion.

The stops herein described for arresting the reverse rotary motion of the mandrel may be used with a rack and pinion, such as in my patent No. 434,539, for giving the reverse rotary motion to the mandrel.

In cases where it is desired to use a number of bands, straps, or cords they may be placed alternately, as shown, and the desired strength obtained by the use of thin and very flexible bands or cords, and by applying a cross-bar between the two bands with the tightening-screw in the middle the tension on the bands will be equalized. If one band, cord, or strip is made use of, it may be wound around the mandrel and the ends secured to the reciprocating rod, and, if desired, the central portion may be connected to the mandrel, as seen in Fig. 8, all these devices being the equivalents of those described and claimed herein.

The roll T, Fig. 5, is supported on the frame adjacent to the mandrel, so that the bar F passes between the same and the mandrel to prevent the bar F vibrating too much under the reciprocating motion.

In the perspective diagram, Fig. 7, the relative positions of the counter-shaft G' and mandrel B are illustrated, and it is to be understood that the counter-shaft G' is usually driven by a belt m to the fast pulley n, and when the belt is shifted to the loose pulley o the mandrel will be stopped. When the parts are at rest, it is often desirable to turn the mandrel around more or less in properly placing the article or adjusting the parts, and this cannot be done without turning the counter-shaft. This is difficult to do when the crank stops on or near the dead-center. I therefore provide a pulley p on the counter-shaft and a belt r to the pulleys s on an auxiliary shaft t, and a hand-wheel u is preferably provided, so that by the hand-wheel or by the belt r the operator can partially rotate the counter-shaft G' in turning the mandrel and adjusting the parts.

It is to be understood that proper bearings are provided for the respective shafts. These are not shown in Fig. 7 for greater clearness.

I claim as my invention—

1. The combination, with the mandrel and chuck or holder for the article acted upon, of a knurling-tool, a holder for the same, a revolving shaft and crank-pin, connecting-rod extending from the crank-pin, and straps or bands fastened to the connecting-rod and

passing around the mandrel in opposite directions and connected therewith for giving to such mandrel a reverse rotary movement first in one direction and then in the other, substantially as set forth.

2. The combination, with the mandrel and holder for the article operated upon, of a revolving shaft, an adjustable crank-pin, a connecting-rod extending from the crank-pin, and sheet-metal straps or bands connected at their outer ends to the connecting-rod and passing in opposite directions around the mandrel and connected to the same, substantially as set forth.

3. The combination, with the mandrel and its holder for the article operated upon, of a revolving shaft, a crank-pin, a connecting-rod extending from the crank-pin, two straps attached to the connecting-rod and passing in opposite directions around the mandrel and fastened thereto, and a tightening device for drawing up one of the bands, substantially as set forth.

4. The combination, with the revolving mandrel and holder for the article operated upon, of a revolving shaft, an adjustable crank-pin, a connecting-rod extending from the crank-pin, two straps fastened at one end to the connecting-rod and passing around the mandrel in one direction and attached to the same and a third strap or band passing around the mandrel and in the opposite direction and attached to the same, and a screw for tightening the bands, substantially as set forth.

5. The combination, with the mandrel and chuck or holder for the article operated upon, of a knurling-tool or holder for the tool, a stationary pinion, a rack gearing into the same, and jaws or guides for the rack connected to and moving with the tool-holder, and a spring for moving the rack in one direction, substantially as set forth.

6. The combination, with the mandrel and chuck or holder for the article operated upon, of a knurl or holder for the knurl, a pivot upon which the holder is allowed to swing, a stationary pinion, a rack gearing to such pinion, jaws or guides connected with the tool-holder and receiving the rack, a spring to press the rack into contact with the pinion, and a lever for giving motion to the tool-holder and parts connected therewith, substantially as set forth.

7. The combination, with the chuck or holder for the article to be operated upon and means for communicating to the same a reverse rotary motion first in one direction and then in the other, of a knurl or rotary die, a holder for the same, mechanism for support-

ing the holder and for pressing the knurl to the work, a pivot upon which the tool can swing laterally, a rack and pinion for moving the tool-holder upon its pivot, and a spring for keeping the rack and pinion in gear, substantially as set forth.

8. The combination, with the mandrel and holder for the article operated on, of a reciprocating rod and means for giving to the mandrel a reverse rotary motion from the rod, and stops for limiting the rotary movement in opposite directions, substantially as specified.

9. The combination, with the mandrel and holder for the article operated upon, of a reciprocating rod, straps passing in opposite directions around the mandrel and connected to the rod and mandrel, respectively, and elastic stops for limiting the rotary movement in opposite directions, substantially as specified.

10. The combination, with the mandrel and holder for the article to be knurled, of a reciprocating rod and means for giving to the mandrel a reverse rotary movement from the rod, and stops connected to the mandrel and rod, respectively, for limiting the rotary movement in opposite directions, substantially as set forth.

11. The combination, with the mandrel and holder for the article to be knurled, of a reciprocating rod, means for giving to the mandrel a reverse rotary movement from the reciprocating rod, and adjustable stops for limiting the rotary movement in opposite directions, substantially as set forth.

12. The combination, with the mandrel and holder for the article operated upon, of a reciprocating rod, straps or bands passing in opposite directions around the mandrel and connected to the rod and mandrel, respectively, and adjustable elastic stops for limiting the rotary movement of the mandrel in opposite directions, substantially as set forth.

13. The combination, with the mandrel, the counter-shaft, and the crank and connections from the counter-shaft to the mandrel, of an auxiliary shaft near the mandrel and in a position convenient to be turned by the workman, and a belt and pulleys from the auxiliary shaft to the counter-shaft for moving the latter, substantially as specified.

Signed by me this 10th day of November, 1890.

F. ECAUBERT.

Witnesses:

GEO. T. PINCKNEY,
WILLIAM G. MOTT.