

J. H. BURDICK.
NUT MAKING MACHINE.

No. 460,553.

Patented Oct. 6, 1891.

Fig. 1.

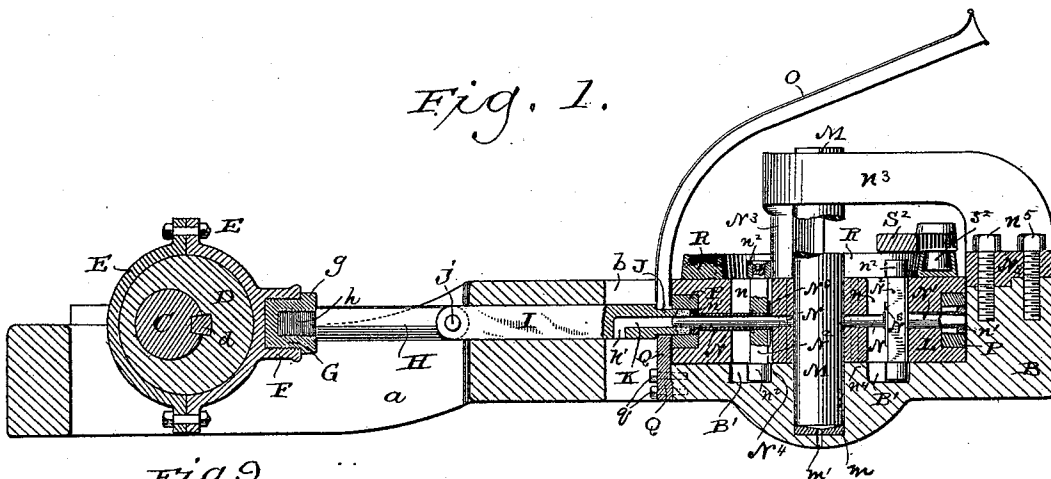


Fig. 9.

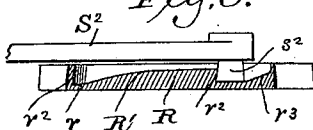
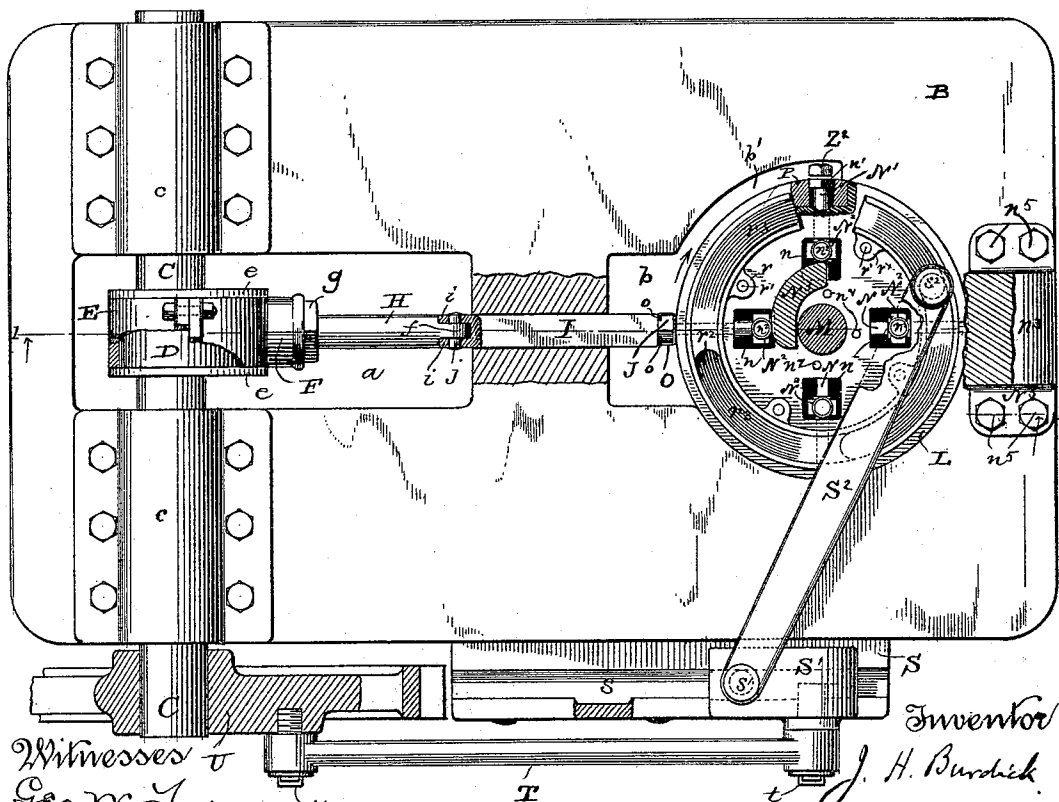


Fig. 2.



Witnesses to
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(No Model.)

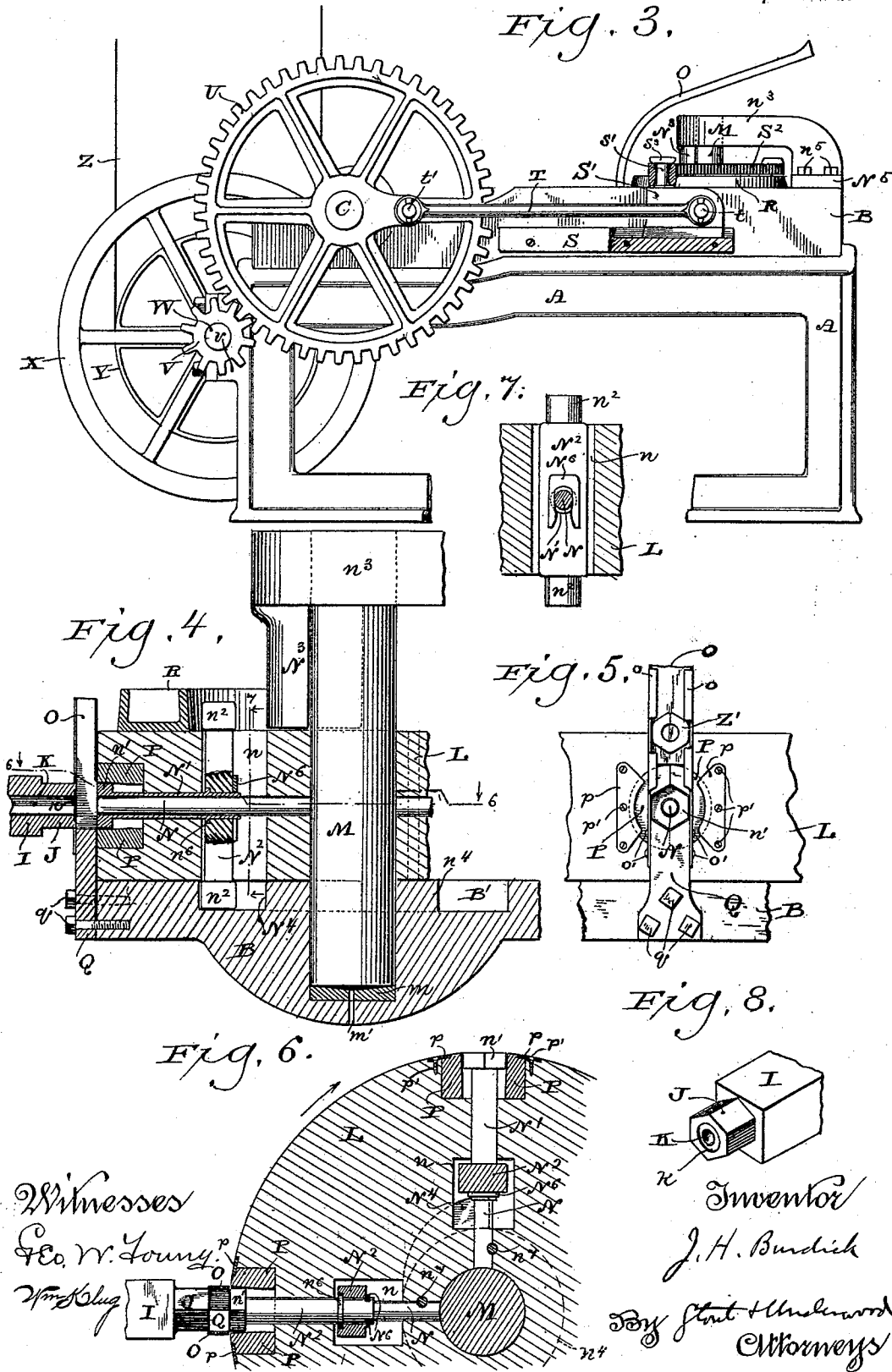
2 Sheets—Sheet 2.

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Fig. 3.



Witnesses

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UNITED STATES PATENT OFFICE.

JUSTIN H. BURDICK, OF MILTON, ASSIGNOR TO THE ELASTIC NUT COMPANY,
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NUT-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 460,553, dated October 6, 1891.

Application filed July 15, 1889. Serial No: 317,589. (No model.)

To all whom it may concern:

Be it known that I, JUSTIN H. BURDICK, of Milton, in the county of Rock, and in the State of Wisconsin, have invented certain
5 new and useful Improvements in Nut-Making Machines; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates to nut-making machines; and it consists in certain peculiarities of construction, as will be fully set forth hereinafter and subsequently claimed.

In the drawings, Figure 1 is a vertical longitudinal section through the operative parts
15 of my present machine on the line 1 1 of Fig. 2. Fig. 2 is a plan view of said machine with portions removed or broken away to illustrate the construction beneath. Fig. 3 is a side elevation of said machine, also partly
20 broken away. Fig. 4 is an enlarged detail view of part of the die-disk and attachments. Fig. 5 is a detail front elevation of a portion of the die-disk and feed-spout. Fig. 6 is a detail sectional view on the line 6 6 of Fig. 4.
25 Fig. 7 is a detail sectional view on the line 7 7 of Fig. 4. Fig. 8 is a detail perspective view of the end of the crowner, and Fig. 9 is a detail partly sectional view of the ratchet-groove.

30 A is the supporting-frame of my machine, and B is the solid bed-plate resting thereon, the latter having two openings *a* and *b* of the outlines best shown in Fig. 2.

Extending transversely across the rear end
35 of the bed-plate is a shaft C, resting in transverse recesses on each side of the opening *a*, (which recesses are preferably lined with Babbitt metal,) and over these parts of the shaft are the boxes *c c*, duly bolted to the bed-plate. D is an eccentric keyed, as shown at
40 *d*, to said shaft, and having peripheral edge flanges *e e*, which receive between them the eccentric-strap E, formed in two parts and bolted together, as shown, the forward part
45 having an interiorly screw-threaded boss F, which receives a differential nut G, having exterior screw-threads corresponding to those of the boss F, and a socket or bore having screw-threads cut in opposition to the said exterior threads for the reception of the screw-threaded rear end *h* of the connecting-rod H,

the nut G having a polygonal-faced flange *g* for convenience in adjusting the same.

The forward end of the connecting-rod H is pivoted to the rear end of the crowner-stem
55 I, as by a tongue *f* on one part and cheek-pieces *i i* on the other part, and pivot *j*, as shown. The front end of the crowner-stem carries a crowner J, which may be either solid with the stem, as shown, or made separate
60 therefrom and secured thereto, as preferred. The crowner and its stem are provided with a central bore K, extending back a short distance and thence extended down through the lower side of the crowner-stem, while the face
65 of the said crowner has a shape corresponding to that to be given the crown of the nut, as indicated by the dished or beveled annular depression *k*.

The front portion of the bed-plate B is centrally cut away on the upper side to receive
70 the revolving die-disk L and its central pivot M, the latter being pointed at its base and stepped on a pillow-block *m*, there being an opening *m'* extending through said pillow-
75 block and the bottom of the bed-plate B beneath.

The die-disk L herein illustrated revolves with its pivot M, and is shown provided with four mandrels N N, though the number, more
80 or less, is immaterial, there being for each mandrel an ejector-sleeve N', covering the outer end of said mandrel, the outer end of the sleeve terminating in a peripheral flange
85 *n'*, forming an ejector proper, polygonal-faced in the illustration given and corresponding to the shape of the die and nut. The rear end of this sleeve passes through a vertical guide-arm N², having rollers *n*² at each end, which project through vertical openings *n* in
90 the die-disk, and whose rollers *n*² bear against the upper and lower segmental guides N³ N⁴, the latter projecting from a hub or boss *n*⁴, surrounding the pivot M and forming a part of the bed-plate B, (the said hub forming one
95 wall of the annular groove B', of a width about double the diameter of the rollers *n*² located therein,) and the former depending from the rear end of a bent arm *n*³, rising from its flanged base N⁵ on the front of the bed-plate
100 B, to which said base N⁵ is secured, as by bolts *n*⁵ *n*⁵, the adjacent surfaces of the base

N⁵, and bed-plate B being shouldered or offset, as shown in Fig. 1, for greater security, and the said arm *n*³ being perforated to form the upper bearing of the described pivot M.
 5 The described sleeve N' is held to its arm N² by an annular flange or collar *n*⁶ on one side of the arm and a spring-key N⁶ on the other side thereof, and the rear ends of the mandrels N pass through horizontal perforations
 10 in the die-disk L and bear against the pivot M, and are held in place by vertical pins or keys *n*⁷, as best shown in Fig. 6.

The die-disk L is mortised at intervals along its periphery in line with the described
 15 mandrels for the reception of the dies, each made in two parts P P, that have a central opening when brought together to place within the described mortises, and secured by the plates *p* *p*, fastened to said die-disk, as by
 20 screws *p*' *p*', as best shown in Fig. 5, and this die-opening tapers from its outer toward its inner end, as shown clearly in Figs. 4 and 6, the said opening being of whatever configuration is desired, that shown in the present
 25 drawings being hexagonal.

O is a curved feed-spout extending down over the forward part of the machine to a supporting-arm Q, whose upper end is of a height and a shape (as hexagonal) adapted to
 30 hold the nut-blank, hereinafter described, squarely before the die-opening, and which arm is secured by bolts *q* *q* to the bed-plate B, (against the front wall of the described slot *p*), the said spout O being partly open at the
 35 rear when it has only the intumed flanges *o* *o* terminating (together with the front wall of said spout) above the line of the crowner J and the side walls of the said spout continuing down and being secured to the arm Q, as
 40 by bolts *o*' *o*', as shown.

R represents a ratchet-groove annulus having lugs *r*, by means of which it is secured (as by bolts *r*') to the top of the die-disk L, and R' represents the said ratchet-groove
 45 formed in the upper face of the said annulus R, having a succession of vertical walls *r*² and inclines *r*³, as best shown in Fig. 9.

S is a guide-block secured to one side of the bed-plate B and having a longitudinal
 50 dovetailed groove *s* in its upper face, which receives the corresponding dovetailed part of a slide-block S', and to a pin *s*' on this slide-block there is pivoted one end of a pawl-arm S², whose other end bears a depending pin *s*²,
 55 engaging with the hereinbefore-described ratchet-groove R', the pawl-arm S² having a rocking bearing on the first-named pin *s*' (as shown at *s*³ in Fig. 3) to allow of the rise and fall of the other end of said pawl-arm. The
 60 said slide-block S' has another pin *t*, by which it is connected by pitman T to a wrist-pin *t*' on the gear-wheel U, mounted on the adjacent end of the shaft C. This gear-wheel U meshes with a pinion V on a shaft W, journaled in
 65 boxes *v* on the rear end of the supporting-frame A, and the other end of this shaft W carries a balance-wheel X and belt-pulley Y,

the latter being for the reception of the power-belt Z.

The operation of my machine will be understood from the foregoing description of its
 70 construction, taken in connection with the drawings.

My present machine is one adapted to make a nut from a nut-blank or ring of metal, and
 75 in Fig. 5 I show at Z' a nut-blank, which, in this instance, consists of a strip of metal previously bent into a ring with an approximately hexagonal periphery; but it will be understood that the shape of the periphery of
 80 the nut-blank, or the manner of forming the same prior to its introduction into this machine is wholly material. The nut-blank is fed to the spout O, and slides down within the
 85 same, resting on the upper end of the arm Q, directly in front of the die-opening, and as the shaft C revolves the eccentric thereon forces the crowner-stem forward and the
 90 crowner drives the nut-blank into the die-opening, upsetting the metal of the blank and filling out the corners or angles true to the die, and at the same time forming the crown and
 95 butt upon the opposite ends of the nut, which is now a complete blank nut, which, as stated, is here shown with a hexagonal periphery, but which may of course be of any configuration
 100 desired, that depending solely upon the particular die employed. As the shaft C is in continuous revolution and the feeding of the nut-blanks likewise continuous, the
 105 crowner will begin to withdraw (consequent upon the eccentric on said shaft) the moment its forward stroke has been given, and coincidentally with said withdrawal the gear-wheel
 110 U on said shaft and wrist-pin *t*' on said gear-wheel will draw on the pitman T, which latter will retract the slide-block S' on its guide
 115 S, and thereby pull on the pawl-arm S², the pin *s*² at the free end of said arm moving up over an incline *r*³ and engaging with a wall
 120 *r*² of the ratchet-groove R', (the described rocking-bearing *s*³ permitting the necessary rise and fall of the pawl-arm S²,) and thereby causing a quarter-revolution of the die-disk
 125 L (in the arrangement shown) at each revolution of the shaft C, and thereby presenting another die-opening in front of the crowner, which is now in position to operate on the
 130 next nut-blank just dropped down to place, while the nut just completed is ejected from its die by reason of the described segmental guides N³ N⁴, against which bear the rollers
 135 *n*² *n*² of the vertical guide-arm N², secured to the sleeve N' of the ejector *n*', and thereby force said ejector outward to the circumferential line of the die-disk in the described
 140 quarter-revolution thereof, and eject the newly-made nut Z², which drops down through the slot *b* or through some part of its extension *b*', as shown in Fig. 2. These blank
 145 nuts may, of course, be tapped to any pitch desired, but this forms no part of my present invention.

The bore K in the crowner and stem, which

is for the reception of the mandrels N, is extended downward, as shown at K', for the escape of dirt, scale, or other foreign matter, and the opening *m'* beneath the pivot M is for the escape of spent grease arising from the necessary lubrication of the pivot-bearing.

The described construction of the differential connection between the eccentric-strap E and connecting-rod H enables the limit of forward movement of the crowner to be adjusted to a nicety.

The object of making the die-opening tapering from its outer to its inner end is to facilitate the entrance of the nut-blank therein, as well as the ejection of the completed nut therefrom.

The outer end of each mandrel is slightly tapered for a length somewhat greater than the depth of the nut, as shown in Figs. 1 and 4, to enable the nut to be the more readily stripped therefrom when being ejected.

A great advantage of my rotating multiple disk lies in the fact that the time required to bring a die and mandrel again into use after the ejection of a nut, although brief, is sufficient to enable the said parts to become cool, and this permits a continuous rapid use of my device, impracticable with a stationary single die and mandrel.

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

1. In a nut-making machine, the combination, with a suitable supporting-frame and a revolving shaft journaled therein, of an eccentric secured to said shaft and provided with an eccentric-strap having an interiorly screw-threaded boss, a differential nut screwed thereto, a connecting-rod secured to said nut, a crowner-stem pivoted to said connecting-rod and terminating at its free end in a crowner, and a die located in line with said crowner, substantially as set forth.

2. In a nut-making machine, the combination, with a suitable supporting-frame and a revolving shaft journaled therein, of an eccentric secured to said shaft and provided with an eccentric-strap having an interiorly screw-threaded boss, a differential nut screwed thereto, a connecting-rod secured to said nut, a crowner-stem pivoted to said connecting-rod and terminating at its free end in a crowner provided with a central longitudinal bore, a die located in line with said crowner and having a central opening also in line with that in said crowner, and a mandrel projecting through said central opening in the die and adapted to be received in said opening in the crowner, substantially as set forth.

3. In a nut-making machine, the combination, with a suitable supporting-frame and a revolving shaft journaled therein and provided with an eccentric, of a crowner-stem carrying a crowner and connected to said eccentric, a rotating multiple-die disk whose die-openings are adapted to be brought success-

ively in line with said crowner, a ratchet-groove annulus secured to the top of said die-disk, a guide-block secured to the frame, a wheel on the said revolving shaft carrying a wrist-pin, a slide-block moving on said guide-block, a pawl-arm connected to said slide-block and engaging with said ratchet-groove, and a pitman connecting said slide-block with the wrist-pin on said wheel, substantially as set forth.

4. In a nut-making machine, the combination, with a suitable supporting-frame and a revolving shaft journaled therein and provided with an eccentric, of a crowner-stem connected to said eccentric and terminating at its free end in a crowner provided with a central longitudinal bore, a rotating multiple-die disk having die-openings and dies with central openings, mandrels projecting through said die-openings and adapted to be received successively in the crowner-opening as the die-disk is rotated, a ratchet-groove annulus secured to the top of said die-disk, a guide-block secured to the frame, a wheel on the said revolving shaft carrying a wrist-pin, a slide-block moving on said guide-block, a pawl-arm connected to said slide-block and engaging with said ratchet-groove, and a pitman connecting said slide-block with the wrist-pin on said wheel, substantially as set forth.

5. In a nut-making machine, the combination, with the bed-plate provided with a central opening having an annular groove and a segmental guide at its base, of a rearwardly-bent arm projecting over said opening and having a segmental guide depending from its rear end, a vertical pivot stepped in said bed-plate and having its upper bearing in said bent arm, a multiple-die disk secured to said vertical pivot and having die-openings and dies around its periphery and vertical openings in line therewith and communicating with the said annular groove and by horizontal openings with the said die-openings, mandrels extending through the horizontal openings and die-openings, sleeves on the said mandrels terminating at their outer ends with peripheral ejecting-flanges and having vertical guide-arms secured to their rear ends, and rollers on the ends of said vertical guide-arms adapted for contact with the said upper and lower segmental guides, substantially as set forth.

6. In a nut-making machine, the combination, with the die having a central opening, of a mandrel projecting therethrough and tapered at its outer end for a length somewhat greater than the depth of the nut, substantially as and for the purpose set forth.

7. In a nut-making machine, the combination of a mandrel with a sleeve covering and moving upon the outer part thereof and terminating in a peripheral ejector-flange, substantially as and for the purpose set forth.

8. In a nut-making machine, the combination, with the die having a central opening

tapering from its outer to its inner end, of a mandrel projecting therethrough and tapered at its outer end for a length somewhat greater than the depth of the nut, substantially as
5 and for the purpose set forth.

9. In a nut-making machine, the combination, with the die having a central opening tapering from its outer to its inner end, of a mandrel projecting therethrough, and a sleeve
10 covering and moving upon the outer part thereof and terminating in a peripheral ejector-flange, substantially as and for the purpose set forth.

10. In a nut-making machine, the combination, with the die having a central opening tapering from its outer to its inner end, of a mandrel projecting therethrough and tapered at its outer end for a length somewhat greater than the depth of the nut, and a sleeve covering and moving upon the outer part of said
20 mandrel and terminating in a peripheral ejector-flange, substantially as and for the purpose set forth.

11. In a nut-making machine, the combination, with a rotating multiple-die disk, of a movable crowner having a central longitudinal bore located in the line of the die-openings in said disk, and a series of mandrels,
25 each projecting through one of the die-openings and adapted to be successively received
30

in said crowner-bore as the said disk is rotated, substantially as set forth.

12. In a nut-making machine, the combination, with a rotating multiple-die disk, of a ratchet-groove annulus secured to the top
35 thereof, a slide-block arranged adjacent thereto, and a pawl-arm having a rocking bearing on said slide-block and engaging at its free end with said ratchet-groove, substantially as set forth.

13. In a nut-making machine, the combination, with the bed-plate having a vertical opening therethrough and a recess therein, of a rotary multiple-die disk located in said recess and having die-openings and dies in its
45 periphery, a feed-spout secured to the wall of the said opening and cut away in line with the said die-openings, and a horizontally-moving crowner adapted to pass through said cut-away part of the feed-spout and enter the
50 said die-openings, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand, at Milwaukee, in the county of Milwaukee and State of Wisconsin, in the presence of two witnesses.

JUSTIN H. BURDICK.

Witnesses:

H. G. UNDERWOOD,
WM. KLUG.