(No Model.) 2 Sheets—Sheet 1.

C. E. ROBERTS.

MACHINE FOR FINISHING BOLT HEADS AND NUTS.

No. 521,002. Patented June 5, 1894.

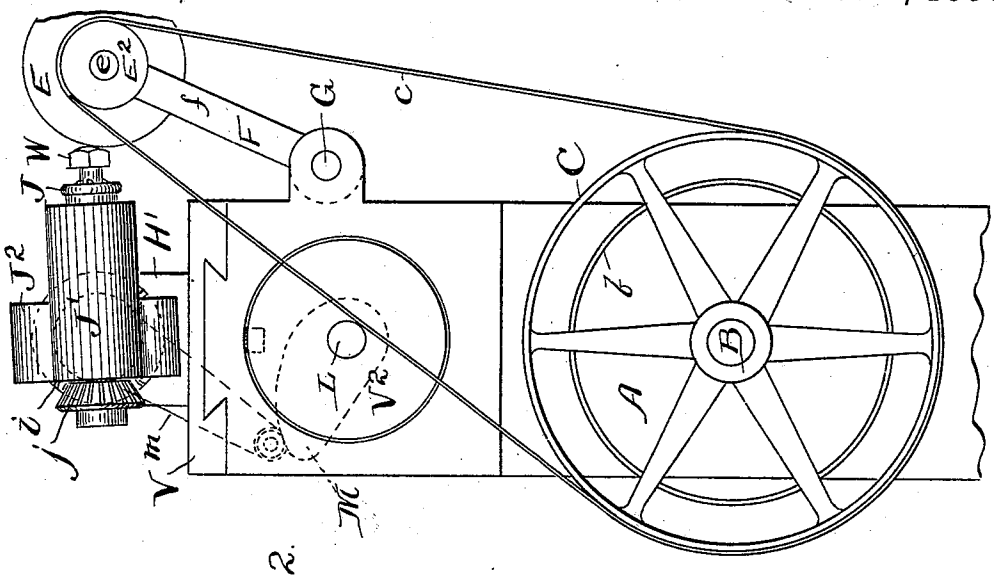

FIG. 2.

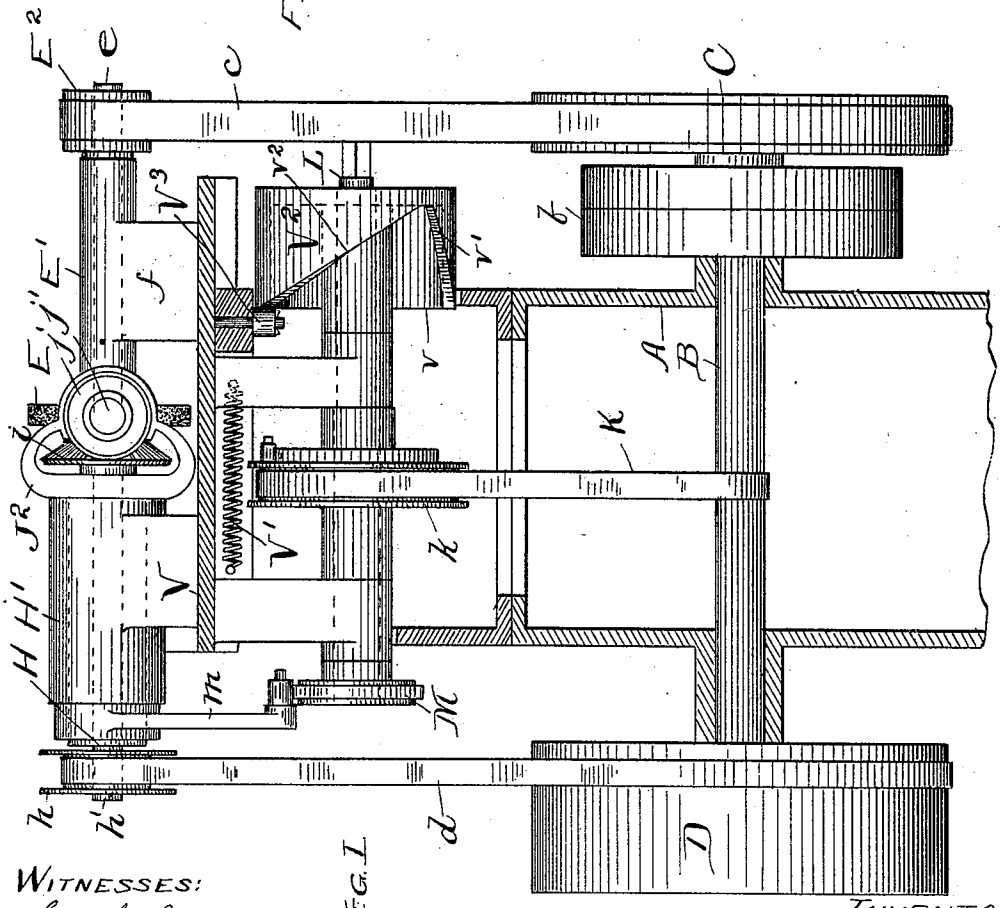

FIG. 1.

WITNESSES:
Lew. C. Curtis
A. W. Munday

INVENTOR:
CHARLES E. ROBERTS.
BY Munday, Evarts & Adcock,
HIS ATTORNEYS.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

C. E. ROBERTS.

MACHINE FOR FINISHING BOLT HEADS AND NUTS.

No. 521,002. Patented June 5, 1894.

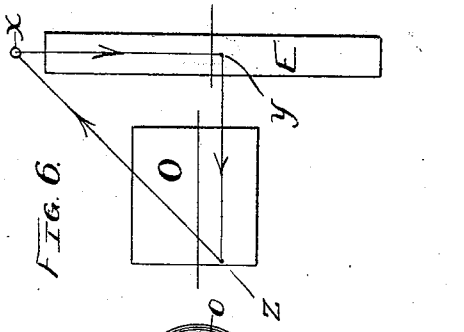

FIG. 6.

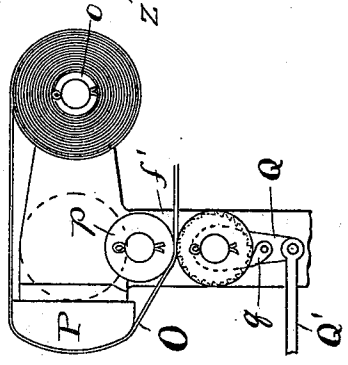

FIG. 5.

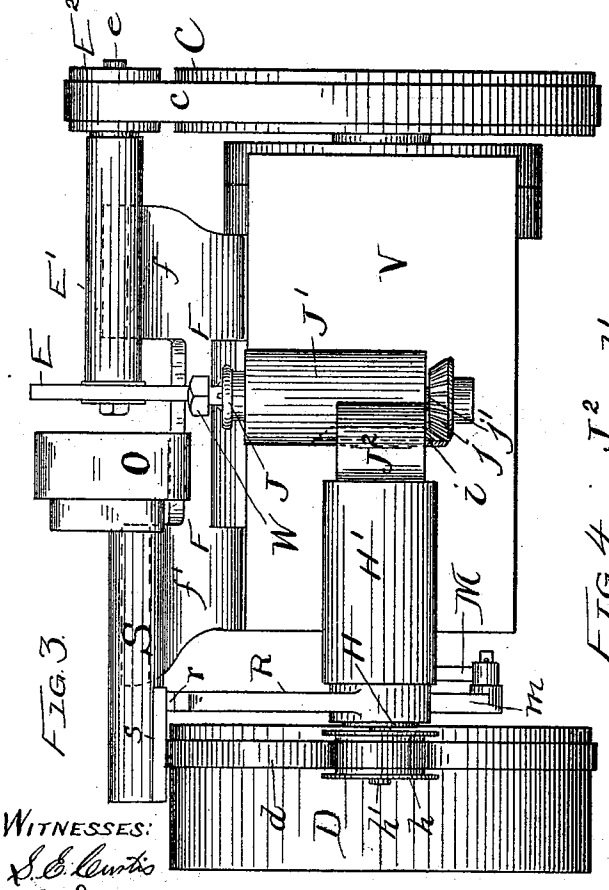

FIG. 3.

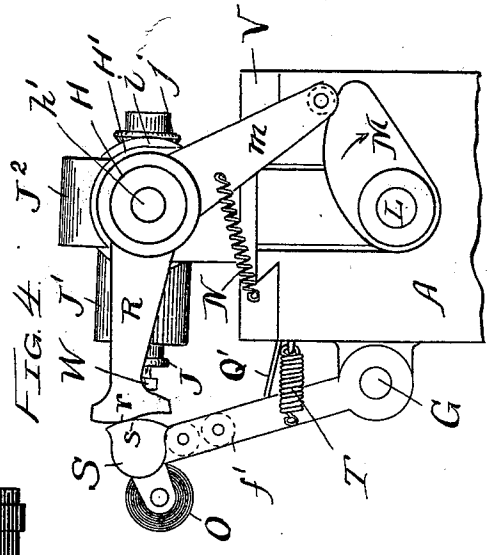

FIG. 4.

WITNESSES:
S. E. Curtis
A. W. Munday.

INVENTOR:
CHARLES E. ROBERTS
BY Munday, Evarts & Adcock,
HIS ATTORNEYS.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

CHARLES E. ROBERTS, OF OAK PARK, ILLINOIS.

MACHINE FOR FINISHING BOLT-HEADS AND NUTS.

SPECIFICATION forming part of Letters Patent No. 521,002, dated June 5, 1894.

Application filed March 7, 1894. Serial No. 502,633. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. ROBERTS, a citizen of the United States, residing in Oak Park, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Machines for Finishing Bolt-Heads and Nuts, of which the following is a specification.

This invention relates to machines for finishing the rounded top faces of bolt heads and nuts.

The object of the invention has in the main been the production of a machine adapted to do this work upon heads and nuts the faces of which are spherical or rounded, whether their contours describe portions of true single circles or of compound circles.

In my improved machine, I secure the bolt or nut in a rapidly rotated chuck, having also an oscillating motion toward the grinding and polishing devices and a shifting movement to bring it in front of both the latter, a cam for giving the oscillating motion to the chuck, a rapidly revolving grinding wheel and a stationary buffing belt, both the wheel and belt being oscillated toward and from the work, means for imparting this oscillation adapted to vary the movement according to the contour of the work, and means for shifting the chuck from operative position in front of the wheel to a like position in front of the belt.

The invention consists in the novel combination of parts and novel construction of parts hereinafter described and pointed out in the claims.

In the accompanying drawings Figure 1 is a front elevation, partly in section, of my improved machine. Fig. 2 is an end elevation. Fig. 3 is a plan. Fig. 4 is a partial end view. Fig. 5 is a detail of the buffing belt and its support. Fig. 6 is a diagram showing the path traveled by the work relative to the grinding wheel and polishing belt.

In said drawings A represents a suitable frame in which is journaled a shaft B driven by pulleys *b*, and also carrying the large pulley C for actuating the emery wheel, and a large pulley D for rotating the work chuck. The emery wheel is shown at E and is mounted upon a shaft *e* journaled in a box E′ and driven from pulley C by belt *c* and pulley E^2, the box E′ being mounted upon one of the uprights *f* of an oscillating frame F supported from a pivotal shaft G.

The wheel E is a grinding wheel, and in order that the work submitted to its action may be perfectly polished, I employ also a polishing or buffing belt O, and at the proper time shift the chuck from the wheel to position where the stock may be operated upon by the belt. The belt is coiled upon a roller *o*, supported upon a horizontal extension of the upright part *f′* of frame F, and its end is drawn around a cushion P having a rounded surface, and thence is passed between the feed rolls *pp*, one of which is provided with a ratchet adapted to receive the pawl *q* mounted upon a swinging lever Q joined at its free end to a stationary part of the machine by the connecting rod Q′. Being mounted in the same frame with the wheel E, the belt is of course oscillated therewith, and these oscillations by reason of the construction described cause a drawing off or uncoiling of the belt at each operation, so that fresh parts of the belt are being brought into action continually. The belt *d* carries power from pulley D to a small pulley *h* on the short shaft *h′* journaled in a sleeve H confined in the bearing H′, said shaft carrying a bevel pinion *i* meshing with a like pinion *j* upon the end of the axis *j′* of the chuck J wherein the bolt W or other work to be finished is held. The chuck J and its axis are supported in a sleeve or box J′ attached by the yoke J^2 to the sleeve H, and stand at right angles to the sleeve as shown, so that any rocking movement imparted to the sleeve will raise or lower the work W. Such a rocking movement is caused by the following devices: A belt K carries motion from the shaft B to a pulley *k* on a countershaft L, and upon shaft L is a cam M adapted to actuate in one direction the arm *m* which is secured upon the sleeve H. A spring N moves the arm in the other direction. The motion thus given to arm *m*, will, as will be understood, rock the sleeve and move the work up and down over the face of the grinding devices.

In order that the machine may be made to accommodate itself to work of varying outline, the grinding devices are also oscillated as follows:—Projecting forwardly from sleeve H is an arm R, the end *r* of which is in contact with the rounded side *s* of the lateral

extension S of frame F. By means of this arm the frame is oscillated away from the chuck whenever the sleeve H is rocked by the cam as already described, and the spring T acts to impart the return oscillation by reason of its tension being exerted toward the chuck. These oscillations are timed relative to the up and down oscillation of the chuck so as to secure the best results, and enable the finishing devices to cover and act upon all parts of the surface of the bolt head or nut, whether that surface be round, or oval or otherwise formed. In order to secure the adaptation of the machine to the varying forms of surfaces, the arm R is changed as required, the differing oscillation necessary with the various forms of heads and nuts being thus imparted to frame F.

The work is first presented to wheel E, and after being operated upon thereby, is shifted into position for action by the polishing belt, and in order to accomplish this the following construction is adopted: The chuck and its rotating and oscillating devices, together with the shaft L are all mounted upon or supported from a slide V mounted upon the main frame and movable laterally thereon, and this slide is actuated in one direction by the spring V′ and in the other direction by a cam V^2 engaging the anti-friction roller V^3 supported from the main frame. The cam is mounted on shaft L and is cup shaped with its rim cut away as shown so as to allow the spring to draw the slide toward the left and thus bring the chuck in front of the polishing belt, and so as to force the slide back again into position where it will again bring the chuck in front of or over the wheel. The straight surface *v* of the cam holds the slide in the position shown at Fig. 1 while the work is being changed, and during the action thereon of the wheel, the inclined surface *v′* allows a somewhat quick shifting over to position for operation by the belt, and the more gradual incline v^2 causes the return movement.

With this construction the operation of the machine is substantially as follows:—Supposing the chuck to be oscillated to its uppermost position indicated at *x* in the diagram, Fig. 6, and in which position it lies above and out of contact with the wheel, the bolt W is inserted in the chuck, and it now begins its downward oscillation, bringing the work down upon the wheel. As the chuck descends the wheel recedes, and these movements are continued until the bolt has descended to a level with the axis of the wheel or slightly below that level (see *y* Fig. 6). By this time the grinding wheel will have completed its work, and the slide is now shifted to the left carrying the chuck to the point *z* Fig. 6, so that the belt commences its work upon the bolt head while the latter is in its lowermost position. The chuck is now gradually raised and moved sidewise and as it rises the polishing belt is brought forward, keeping the belt in operating contact with the work until the latter has moved laterally beyond it in its return to the starting point. The work is thus made to traverse the triangular path seen at Fig. 6.

It should be noted that the grinding wheel operates first upon the outer parts of the bolt head or nut, and finishes its work at the crown or center, while the finishing belt begins work at the center and completes its operation upon the outer portions. This avoids the formation of any fin or overhanging roughness at the horizontal corners of the work.

In order to permit the shifting of the chuck and work, the pulley D is made wide, and the surface *s* of the extension S is made long as shown so that they may act in any position to which the parts may be moved by the shifting operation. The pulleys *h* and *k* are flanged so that they may carry their belts with them in the shifting.

I claim—

1. The combination of the rotating and oscillating chuck for holding the bolt or nut, with a polishing wheel or device oscillating to and from the chuck, substantially as specified.

2. The combination of an axially rotating chuck for holding the bolt or nut, and a rocking support for said chuck and from which it projects at right angles, with a polishing wheel or device having an oscillatory movement to and from the chuck, substantially as specified.

3. The combination of an axially rotating chuck for holding the bolt or nut, means for imparting an oscillation to the chuck, and a polishing wheel or device having an oscillatory movement to and from the chuck, substantially as specified.

4. The combination of the rotating, oscillating and shifting chuck for holding the bolt or nut, with a polishing wheel or device oscillating to and from the chuck, substantially as specified.

5. The combination with a polishing wheel or device, of an axially rotating chuck carrying the work to be polished, and having an oscillatory movement parallel to the face of the wheel so as to present the work thereto at different radial points, substantially as specified.

6. The combination in a machine for finishing bolt heads and nuts, of a grinding device and a polishing device and an oscillating support therefor, with the axially rotating chuck holding the work and having an oscillatory movement, substantially as specified.

7. The combination in a machine for finishing bolt heads and nuts, of a grinding device and a polishing device, and an oscillating support therefor, with the axially rotating chuck for holding the work and having both an oscillatory and a shifting movement, substantially as specified.

8. The combination with the oscillating frame carrying the polishing devices, of a

shifting chuck and its slide, and means whereby said frame is oscillated, substantially as specified.

9. The combination with the coiled polishing belt and its oscillating support, of means for drawing the belt off at each operation of the support, substantially as specified.

10. The combination of the coiled belt, the rounded cushion over which the belt is drawn, and the oscillating support therefor, with an axially rotating chuck having an endwise oscillation over the cushion, substantially as specified.

CHARLES E. ROBERTS.

Witnesses:
H. M. MUNDAY,
EMMA HACK.