No. 817,587. PATENTED APR. 10, 1906.

M. NELSON.

MACHINE FOR DRILLING NUTS AND THE LIKE.

APPLICATION FILED JUNE 20, 1904.

2 SHEETS—SHEET 1.

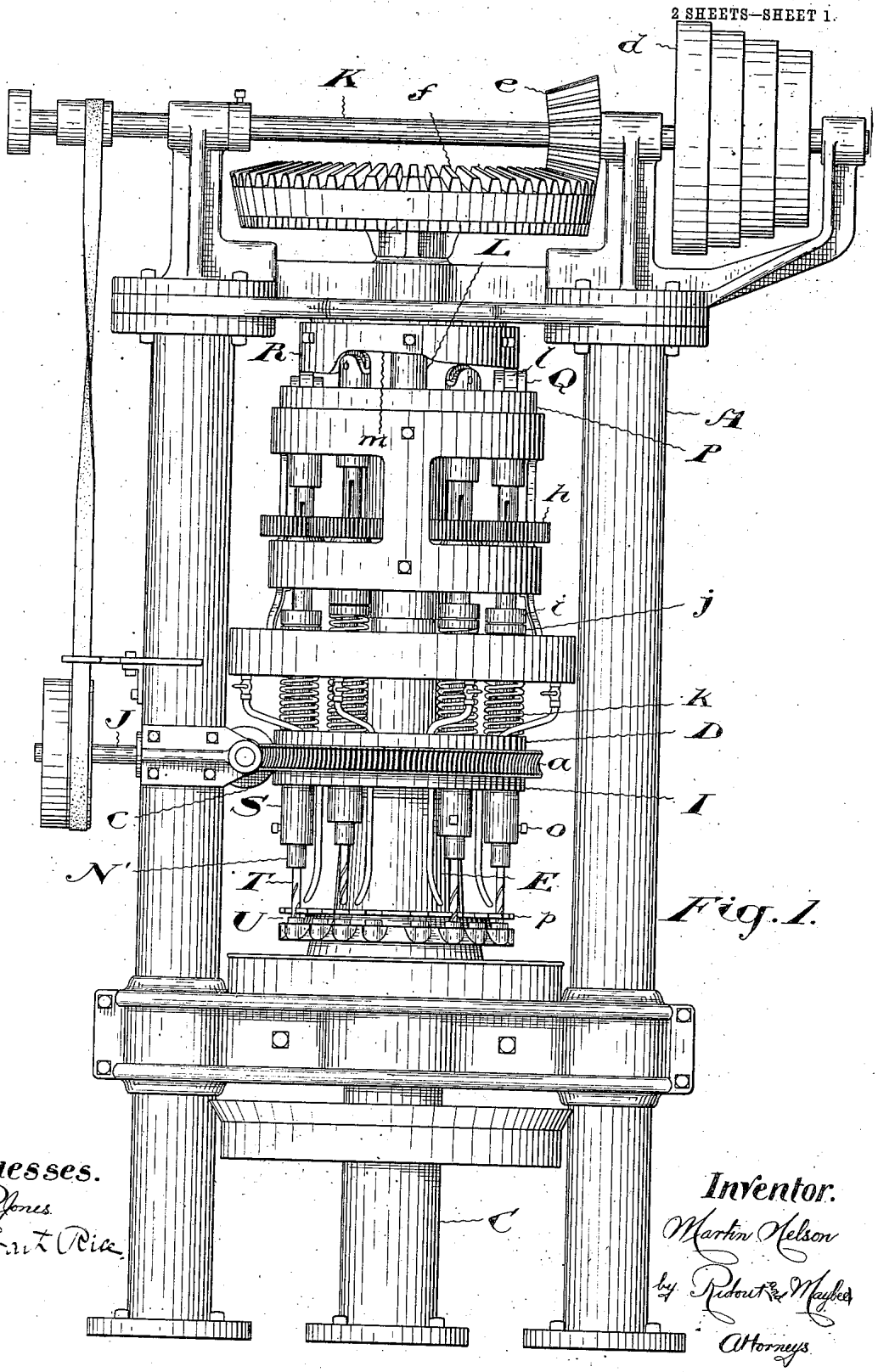

Fig. 1.

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Fig. 3

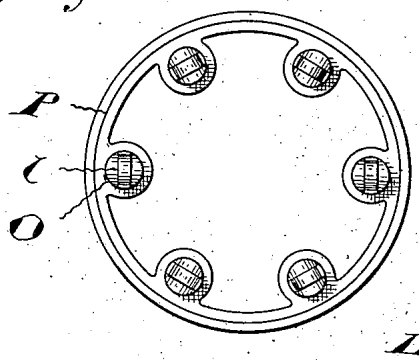


Fig. 4.

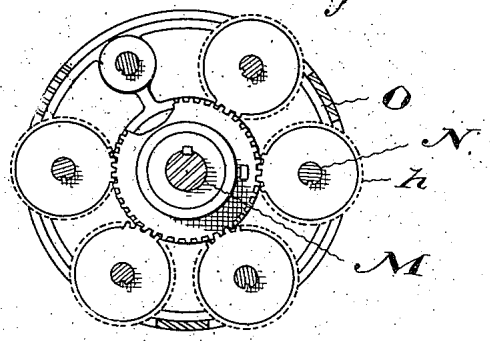


Fig. 5.

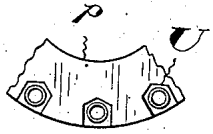
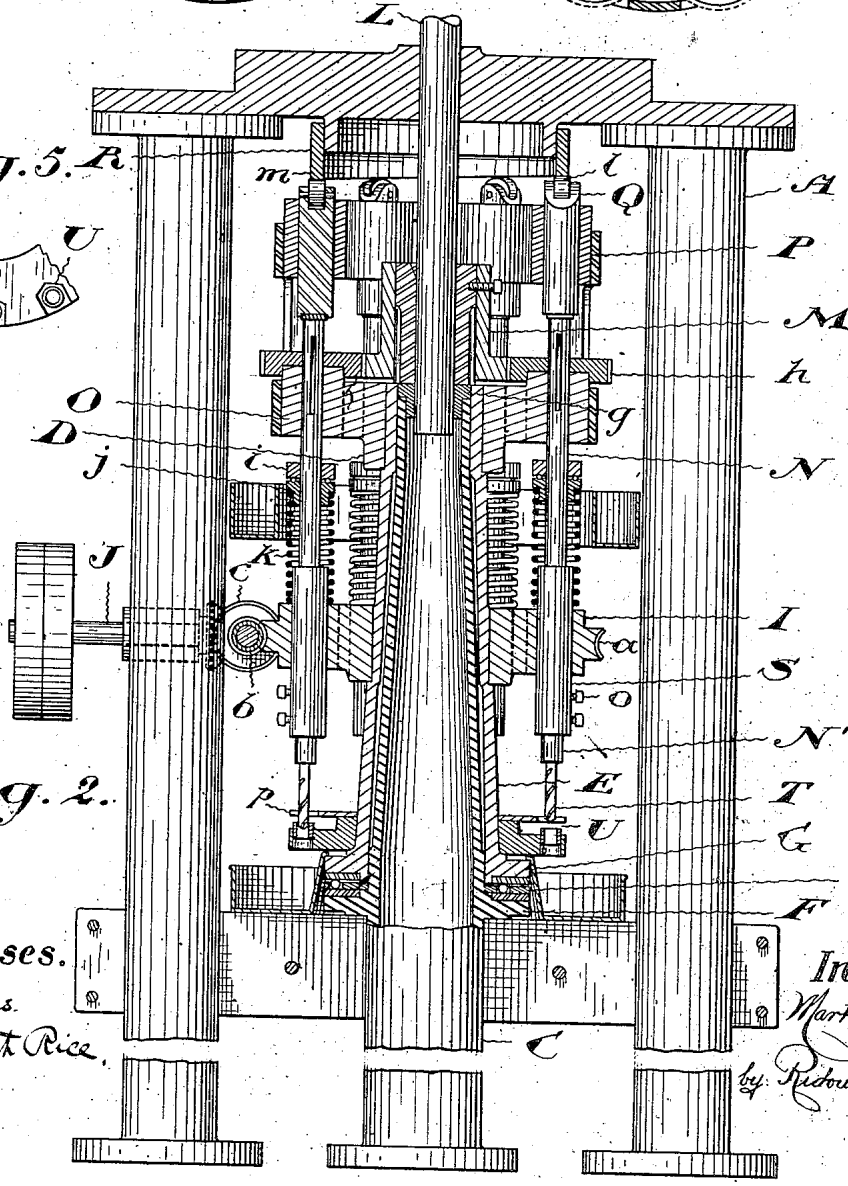


Fig. 2.



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UNITED STATES PATENT OFFICE.

MARTIN NELSON, OF TORONTO, CANADA.

MACHINE FOR DRILLING NUTS AND THE LIKE.

No. 817,587. Specification of Letters Patent. Patented April 10, 1906.

Application filed June 20, 1904. Serial No. 213,330.

To all whom it may concern:

Be it known that I, MARTIN NELSON, of the city of Toronto, Province of Ontario, Canada, have invented certain new and useful Improvements in Machines for Drilling Nuts and the Like, of which the following is a specification.

The object of my invention is to devise a machine for boring and tapping or reaming nuts and the like which will possess great capacity without requiring excessive power to operate it; and it consists, essentially, of a suitably-supported rotatable frame carrying a plurality of nut-sockets, a corresponding series of drill-spindles suitably supported over the sockets, means for positively feeding the drill-spindles, means for retracting the spindles, means for rotating the spindles, and means for rotating the frame.

My invention further lies in the details of construction hereinafter more particularly described and then definitely claimed.

Figure 1 is a front elevation of the machine. Fig. 2 is a sectional elevation of part of the machine. Fig. 3 is a plan view of the slides operating the drill-spindles. Fig. 4 is a plan view of the gearing driving the drill-spindles. Fig. 5 is a detail in plan of three of the nut-sockets.

In the drawings like letters of reference indicate corresponding parts in the different figures.

A is the frame of the machine, preferably formed, as shown, of two standards provided with suitable cross connections.

C is a central vertical tapered post extending up from the base.

D is a drill-frame provided with a central tapered sleeve E, fitted over the post C and having bearings thereon.

On the post is formed a flange F, above which is formed a flange or collar G on the sleeve E. Between these two is fitted a plate H, in which are formed apertures fitted with hardened-metal balls. An effective thrust-bearing is thus provided at the bottom of the drill-frame. The drill-frame is provided with a disk or head I, provided on the outside with a worm-gear *a*. With this worm-gear meshes a worm *b*, journaled at one side of the frame A. This worm derives motion by means of bevel-gearing *c* from a shaft J, also journaled on the frame of the machine. This shaft carries suitable fast and loose pulleys, which are connected by belt with a pulley on a transverse shaft K, journaled in suitable bearings at the top of the frame. This shaft is provided with a series of driving-pulleys *d*, whereby it may be driven from a suitable line of shafting and the speed varied at will. Secured to the shaft K is a bevel-pinion *e*, meshing with a bevel-wheel *f*, secured to a vertical shaft L. This shaft is journaled in the upper cross-bar of the frame A, and its lower end is fitted within a cap *g*, fitted on the upper end of the sleeve E. On this shaft is secured a gear-wheel M, which meshes with the gear-pinions *h*, slidable with feather-keys on the drill-spindles N. These drill-spindles are vertically movable and rotatable in the disks or heads I and O of the drill-frame. Secured to each spindle is a collar *i*. Below this collar is located a loose collar *j*. Between these two collars is formed a ball-race provided with suitable balls to form a ball-bearing. A coil-spring *k* bears against the collar *j* and against the disk or head I. The springs thus tend to normally maintain the drill-spindles retracted, and owing to the ball-bearing arrangement just described the upward pressure of the springs causes little, if any, retarding friction. Above the disk or head O and suitably supported therefrom is a head P. Over each drill-spindle a slide Q is located, vertically movable in the head on a feather-key. These slides rest upon the ends of the spindles, tempered-steel contact-pieces being located at the point of contact. The upper end of each slide is provided with a friction-roller *l*. Above the slides is located a cam-ring R, the cam *m* thereon being adapted to allow a drill-spindle at the front of the machine to lift quickly from its work, then after a short dwell to be brought quickly down to its work again, and subsequently slowly fed forward until its work is completed, when it again arrives at the front of the machine and is quickly retracted from its work to permit of the removal of the bored nut, as hereinafter described.

The lower end of each drill-spindle is provided with a socket S. Within this socket the drill-chuck N′, of any suitable construction, is made vertically adjustable by means of the set-screws *o*. Thus the drills T may be set to suit the thickness of the stock on which they are to be employed or to compensate for wear. Below each drill is formed a drill-socket U. This drill-socket may be of any suitable construction. As shown, it consists merely of a support for the nut and a plate *p*, cut to the shape of the sides of the nut to

prevent it from turning as the drills are rotated.

Suitable devices are employed for supplying suitable lubricant to the work; but I do not claim any particular novelty in this feature of the device.

The operation of the device is substantially as follows: By the rotation of the transverse shaft K the vertical shaft L is set in motion, and this by means of the gearing M *h* operates the drills. At the same time the shaft J is set in operation by the transverse shaft and by means of the bevel-gearing *c* and the worm-gearing *b a* gives the whole drill-frame a rotary motion. This rotary motion by moving the slides Q over the cam *m* causes the drills to be successively brought down to their work, fed until the work is completed, and then retracted, the finished nut being removed at the front of the machine by hand.

It will be noted that the cam-ring R is detachably secured to the frame of the machine above the slides it is intended to operate. Thus by changing the cam-ring the speed of the feed of the drills may be regulated to suit the thickness of the work being operated on or to change the rapidity of the feed. This is a valuable construction, as the machine is expected to work on nuts of different thicknesses and different sizes of bore.

This machine will rapidly and effectively bore the nuts as they come from the former, described in my prior application, filed on or about June 20, 1904, Serial No. 213,329. It is not only rapid in its operation, but efficient means have been provided to make it as frictionless as possible in its operation, so that a minimum of power is required to operate it.

I have described the machine as used for boring nuts. By substituting reamers for drills the machine makes an efficient reamer. By using taps the machine may be adapted for tapping the nuts; but in this case the sockets would require to be replaced by the slide-supports used in tapping-machines, and in the case of large nuts the gearing for the spindles would require to be changed to give slower speed.

What I claim as my invention is—

In a machine for boring nuts and the like the combination of a frame; a drill-frame rotatably supported thereon; means for rotating the drill-frame; a plurality of drill-spindles rotatably and slidably carried thereby; a head rotating with the drill-frame; slides vertically movable therein on feather-keys, one over each drill-spindle; a friction-roller carried by each slide at its upper end; a stationary cam with which the said friction-rollers engage; springs each engaging one of the drill-spindles and the frame and tending to maintain the drill-spindles in contact with the slides; means for rotating the spindles; and nut-sockets formed one below each spindle, substantially as described.

Toronto, June 8, 1904.

MARTIN NELSON.

In presence of—

J. EDW. MAYBEE,

P. R. JONES.