J. JOHNSTON.
NUT-MACHINES.

No. 194,246. Patented Aug. 14, 1877.

Fig: 1.

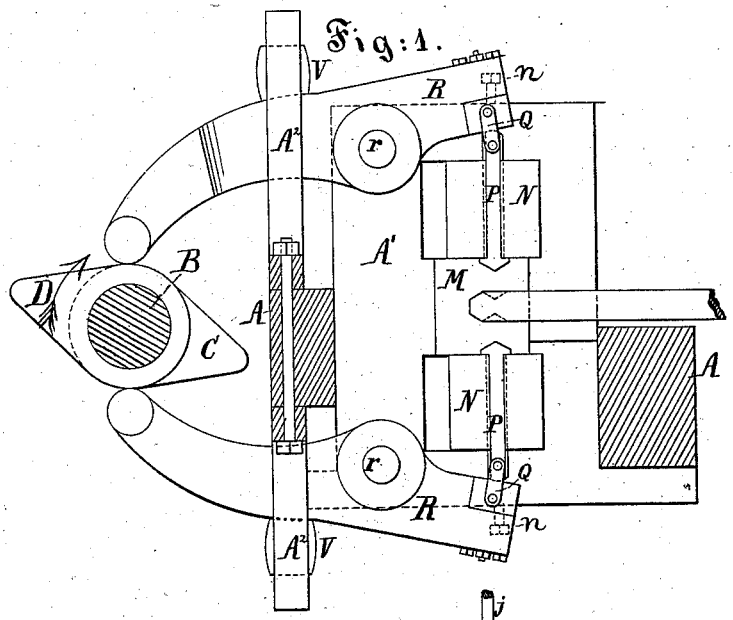



Fig: 2.

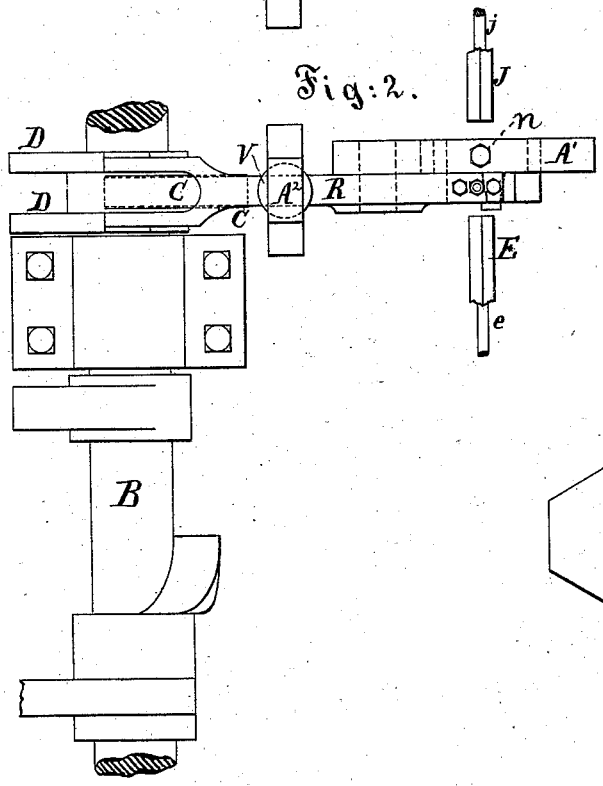
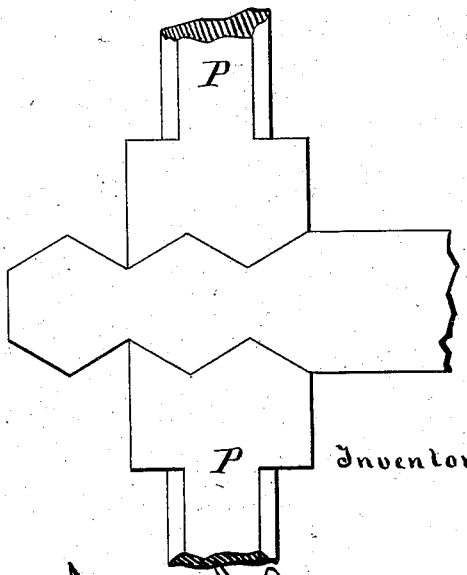



Fig: 3.




Witnesses:
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# UNITED STATES PATENT OFFICE.

JAMES JOHNSTON, OF PATERSON, NEW JERSEY.

## IMPROVEMENT IN NUT-MACHINES.

Specification forming part of Letters Patent No. **194,246**, dated August 14, 1877; application filed June 18, 1877.

*To all whom it may concern:*

Be it known that I, JAMES JOHNSTON, of Paterson, Passaic county, in the State of New Jersey, have invented certain Improvements relating to Nut-Machines, of which the following is a specification:

My improved machine is adapted for receiving a bar of heated metal of the proper thickness and of indefinite length, which, being thrust into the machine, is impressed, cut off, punched, shaped, and dropped in the form of a complete nut, requiring only to be afterward tapped, and, if necessary in any case, finished by grinding or other tools on the exterior.

The bar, heated throughout or at the end which is to be worked up, as it is urged by hand or otherwise into the proper cavity, is first impressed or indented on each edge, forming two V-shaped notches opposite to each other. This is effected by dies which approach each other to an exactly predetermined extent, leaving a just sufficient space between to form one of the hexagonal sides of the completed nut. Immediately that the dies are withdrawn, the bar is sheared off at the contracted neck thus formed, and the completed nut is moved away and compressed in suitable devices to form a complete nut. The bar is left with its end properly shaped to form one side of the next succeeding nut. On being fed forward to a just proper extent, the bar is again indented on both edges, and again sheared off, and so on.

The devices which compress the nut and perfect its form, and the devices which form the proper hole in it, may be of the ordinary and long-approved construction.

The following is a description of what I consider the best means of carrying out the invention.

The accompanying drawings form a part of this specification, and represent the novel parts, with so much of the other parts as is necessary to indicate their relations thereto.

Figure 1 is a vertical section on or near the plane in which the hot bar is introduced. Fig. 2 is a plan view. Fig. 3 represents a modification of some of the parts on a larger scale.

Similar letters of reference indicate like parts in all the figures.

A is a stout frame-work of cast-iron or other suitable material, and B is a main driving-shaft, which, it will be understood, is turned uniformly in the direction of the arrow, either directly or through the medium of gearing, by a steam-engine or other suitable power. (Not represented.) M is a solid die fitted in a housing, $A^1$, so that it is firmly but removably held. I have in my experiments made the die M of cast-iron, case-hardened, and the portion $A^1$ of the framing of wrought-iron, strongly secured by bolting to the frame A. Immediately above and below the die M are two blocks, N N, of steel or other suitable material, each formed with a vertical dovetailed groove. In the groove runs a stout slide, P, of steel or other suitable material, having a double-beveled or V-shaped end, adapted to produce the proper V-shaped impressions in the edges of the bar. These slides P are worked simultaneously toward each other to produce the impression, and are then immediately withdrawn.

I operate the slides P, by the aid of links Q, from the short arms of stout levers R, which turn on centers *r*, and are vibrated by cams or wipers on the shaft B.

In order to obtain only one vibration of the levers R R, and consequently one impression by each of the slides or hammers P at each complete revolution of the shaft B, without any twisting strain on any part, I make the levers R R differ from each other, the lowermost being a single-ended lever worked by a single cam, C, and the uppermost being forked, as shown, and operated by a double cam or by two separated cams, D D. The space between the forks of the upper lever R must be sufficient to allow the cam C to pass without touching, and, conversely, the space between the cams D D is sufficient to pass the lowermost lever R without touching.

$A^2$ $A^2$ are stout straps of wrought-iron or other suitable material, loosely inclosing the levers R R, and serving as abutments for blocks of rubber V, serving as springs to keep the levers R R in contact with their respective cams.

All the dies and blocks may be removed and adjusted, to allow for manufacturing nuts of different sizes, different diameters, and of different thicknesses.

It will be observed that the center lines of the dies or hammers P require to be shifted relatively to the center lines of the punches E and J with each change of diameter of the nut. This is accomplished by moving the blocks N, which, when adjusted, may be firmly held in the required position by keys or pinching-screws *n*. E is a hexagonal bar or punch of hardened steel, having a directly endwise reciprocating motion. After the end of the bar has been shaped into the complete hexagonal form, requiring only to be cut off at the contracted neck, the punch E shears it off, and forces the hexagonal blank into the corresponding hexagonal cavity in the solid die M.

Another punch or bar, J, of hexagonal section, is operated by a reciprocating motion in the same line, but at different times. It stands on the other side of the die M, and previous to the cutting off of the bar by the action of the punch E, this punch J enters the cavity in the die, and stands nearly or quite in contact with the bar. When the punch E moves forward, this backing-punch J moves backward, and allows the hot blank to be forced inward against its resistance. After the blank is completely within the die M, these punches J and E firmly compress the nut, giving it a uniform thickness and symmetrical shape.

Both the punches E and J are hollow, the hole in each being in the line of the axis, and carrying internal round punches *e* and *j*, each of a proper size to produce the hole in the nut. These inside punches *e* and *j* are worked by suitable cams with a separate motion from the hexagonal punches, and produce the hole in the nut by proper motions. The small piece punched out of the center by the action of these punches is the only waste. The completed nut is forced out by the die J and dropped into a receptacle below.

The operations may follow each other rapidly. I have in my experiments given the shaft B about fifty revolutions a minute.

Many modifications may be made in the details of the machinery by any good mechanic. Instead of the springs V in the housings or straps $A^2$, springs differently arranged, or other forces, as a piston worked by steam or compressed air, may be employed to return the parts rapidly and reliably to their proper position after each impression of the hammers P P.

One modification to which I attach great importance is shown in Fig. 3. In this the ends of the dies or hammers P, which indent the edges of the bar, are not only formed with the double-beveled ends, as described, but also with an additional single-beveled end, as represented, which bears upon the surface indented by the last previous operation of the same hammer, and serves to steady the material. It aids to insure the perfect position, and consequently the perfect form of the parts, when, as is frequently the case, the iron varies somewhat in hardness in different parts. It is no disadvantage under any circumstances.

I can, with this modification of the form, produce the main or primary indentation one step farther off or one step earlier. This gives the advantage that the lower hammer P is farther out of the way, and less liable to catch and arrest the fall of the finished nut when it is pushed out of the die M. I esteem it practicable to locate the indenting-hammers P more than two steps off, and to form them with more than two beveled projections; but I prefer either the single-ended form first described, or the double-ended, shown in this modification.

I claim as my invention—

In a nut-machine having bevel-ended hammers or swages P and suitable operating means, in combination with a close die, M, and punches E J and their connections, the adjustable guiding means N and confining means *n*, adapted to allow the line of action of the indenting-swages to be readily changed, as herein specified.

In testimony whereof I have hereunto set my hand this 8th day of June, 1877, in the presence of two subscribing witnesses.

JAS. JOHNSTON. [L. S.]

Witnesses:
PETER VAN HOUTEN,
ARTHUR B. LEARY.