No. 676,123. Patented June 11, 1901.

# H. W. CARTER.

## AUTOMATIC TURNING LATHE.

(Application filed Oct. 26, 1900.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.

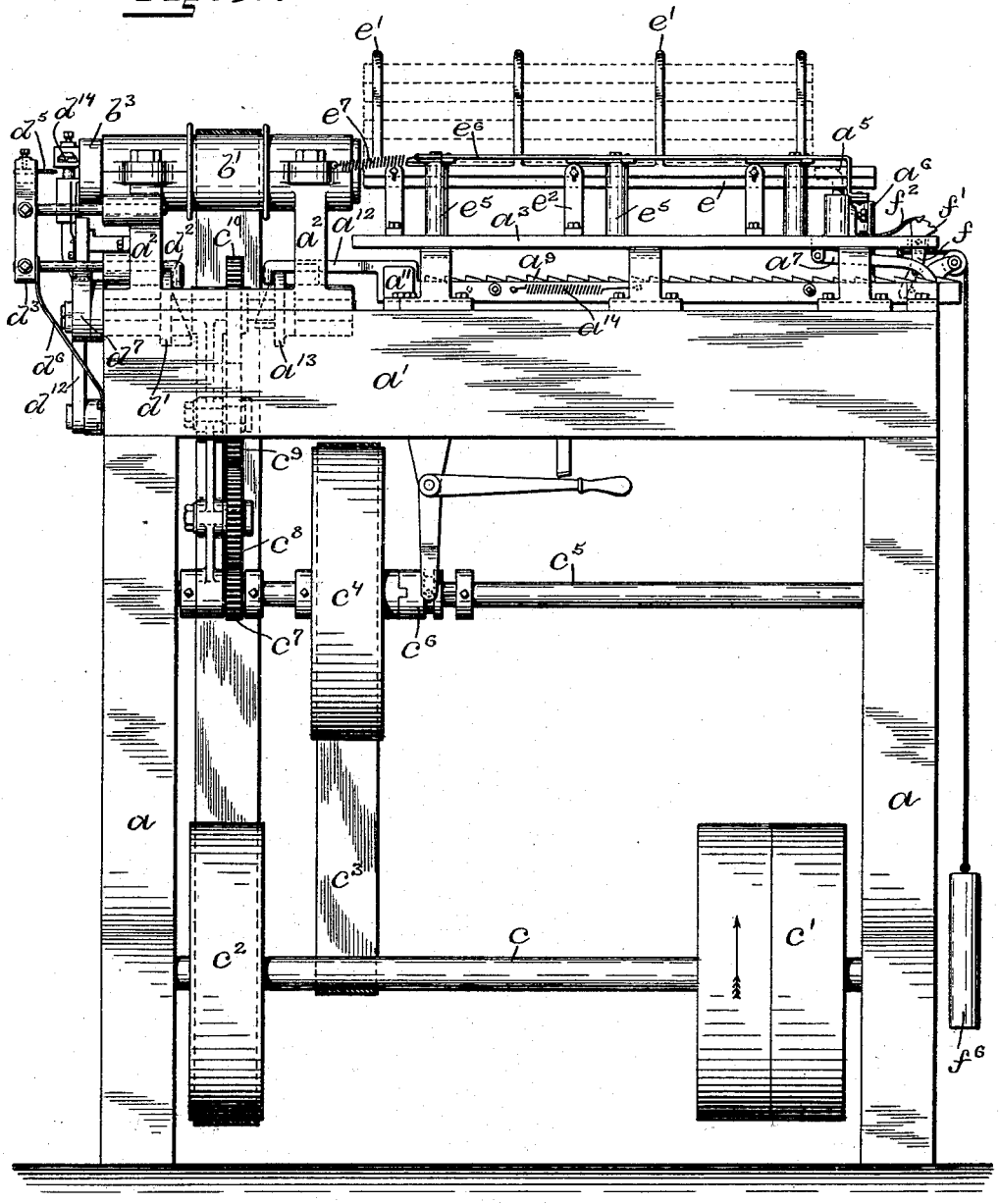


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Fig. 2.

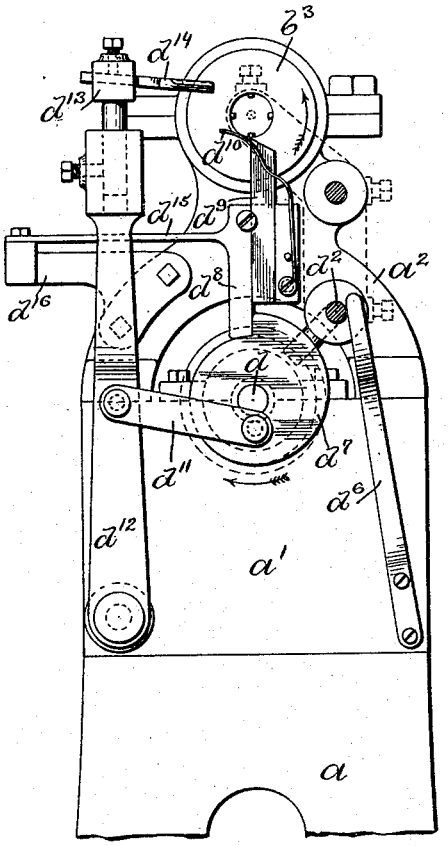



Fig. 3.

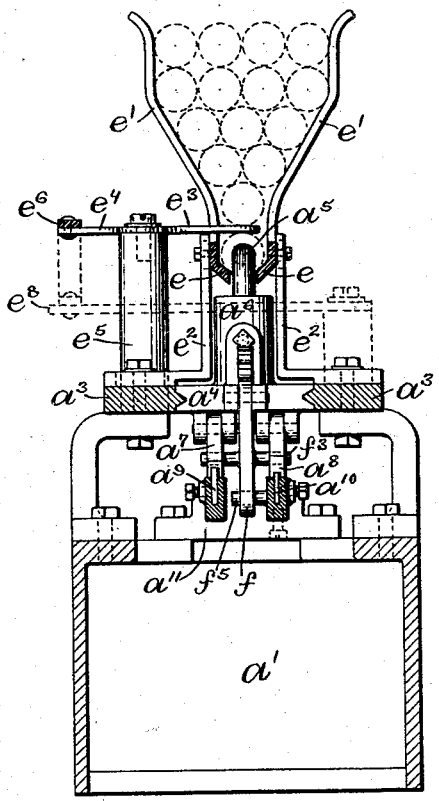
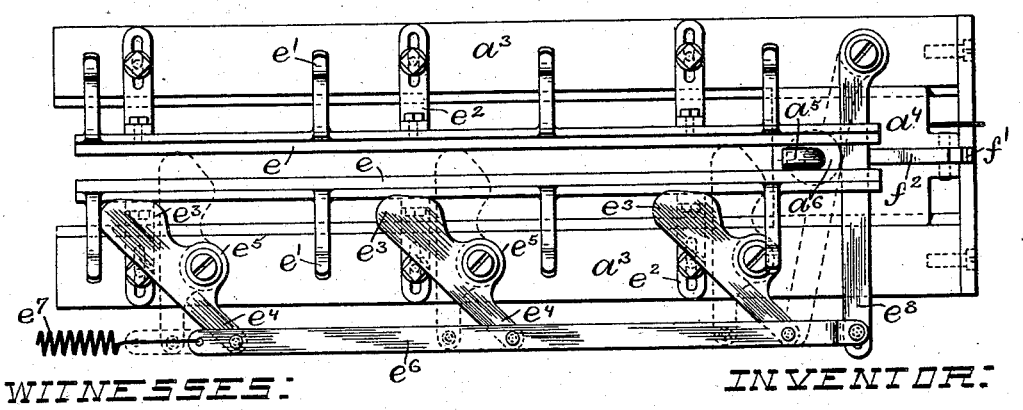



Fig. 4.

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(No Model.) 4 Sheets—Sheet 3.

Fig. 5.

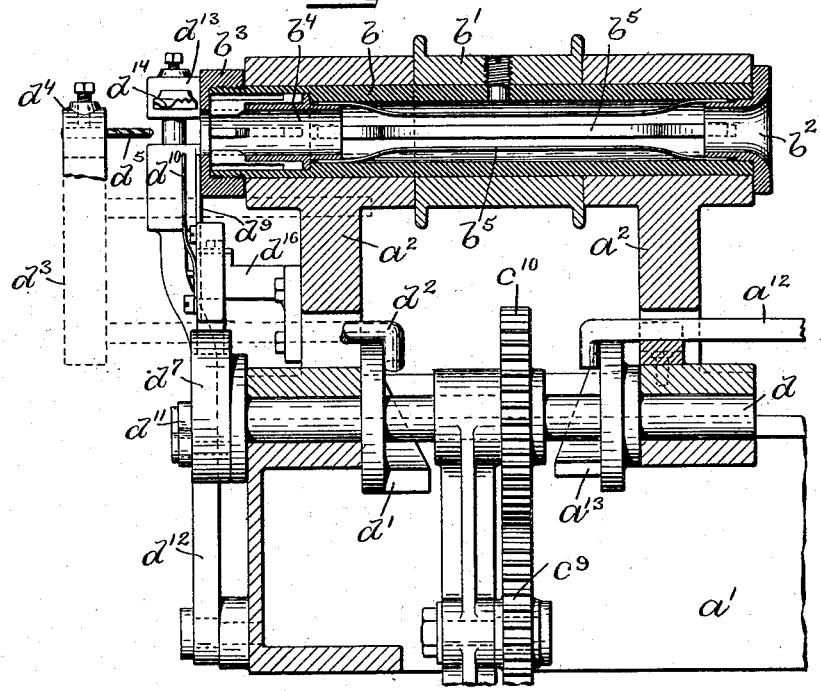
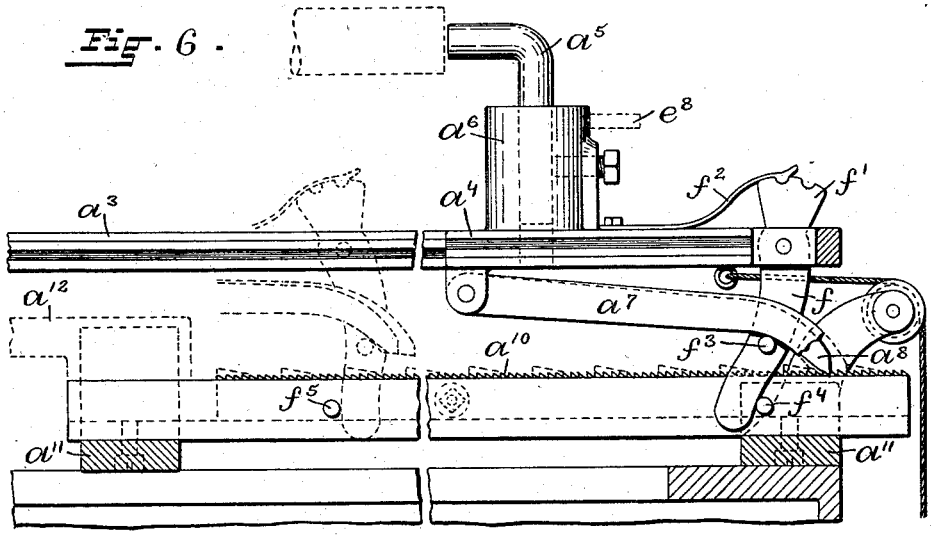



Fig. 6.

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## AUTOMATIC TURNING LATHE.

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(No Model.) 4 Sheets—Sheet 4.

Fig. 7.

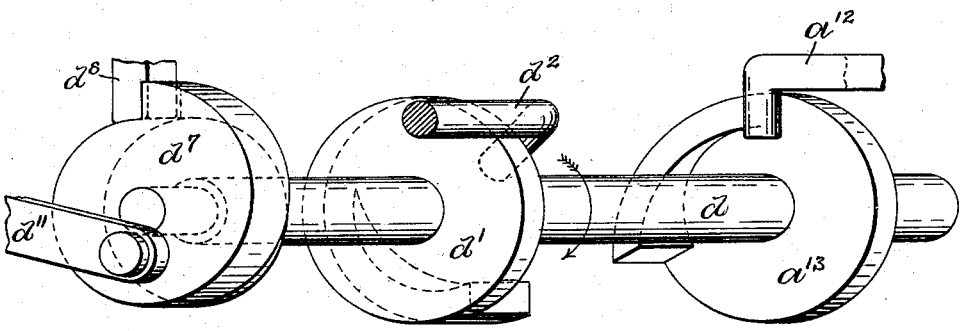



Fig. 8.

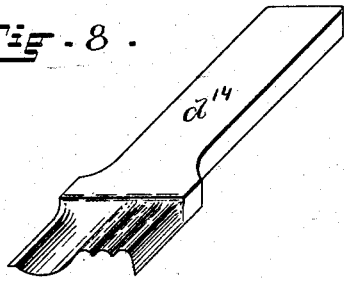



Fig. 9.

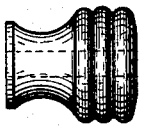
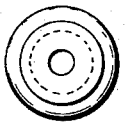


Fig. 10.



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# UNITED STATES PATENT OFFICE.

HENRY W. CARTER, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR OF ONE-HALF TO THE AMERICAN ENAMEL COMPANY, OF SAME PLACE.

## AUTOMATIC TURNING-LATHE.

SPECIFICATION forming part of Letters Patent No. 676,123, dated June 11, 1901.

Application filed October 26, 1900. Serial No. 34,424. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY W. CARTER, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented a new and useful Improvement in Automatic Turning-Lathes, of which the following is a specification.

This invention has reference to an improvement in machines for turning articles; and it consists in the peculiar and novel construction and the combination of parts whereby the material is automatically supplied to the machine and shaped, as will be more fully set forth hereinafter.

Figure 1 is a side view of the machine. Fig. 2 is an end view showing the shaping-tool, the separating-tool, the discharging device, and the mechanism for operating the same. Fig. 3 is a transverse sectional view of the machine. Fig. 4 is a top view of the hopper, showing the stop-operating mechanism by which the stock is automatically delivered. Fig. 5 is a longitudinal sectional view of the head-stock, showing the mechanism whereby the operation of the parts is controlled. Fig. 6 is a longitudinal sectional view of the stock-feeding mechanism. Fig. 7 is a perspective view of the cam-shaft, showing the cams and the parts coöperating therewith. Fig. 8 is a perspective view of one of the cutters used in producing one of the articles for the manufacture of which the machine is adapted. Fig. 9 is a side view, and Fig. 10 an end view, of the article produced by the use of the cutter shown in Fig. 8.

All the parts of the machine are shown in the drawings in the position when a piece of the stock has been released from the hopper and is in position to be operated upon to form a series of the desired articles.

Similar marks of reference indicate corresponding parts in all the figures.

In the drawings, *a a* indicate the standards, and *a'* the bed, of the machine, $a^2$ $a^2$ the supports secured to the bed *a'*, in which the tubular arbor *b* is journaled, and $a^3$ $a^3$ ways supported on brackets secured to the bed *a'*, in which the stock-feeding carriage $a^4$ slides. The stock-pusher $a^5$ consists of a bracket adjustably secured in the post $a^6$, connected with the carriage $a^4$. Two pawls $a^7$ and $a^8$ are pivoted to the under side of the carriage $a^4$ and engage with the racks $a^9$ and $a^{10}$. The rack $a^9$ is provided with coarse ratchet-teeth and the rack $a^{10}$ with finer ratchet-teeth. The racks are supported in ways $a^{11}$. The rack $a^9$, which is the feeding-rack, slides in the ways and is connected by the arm $a^{12}$ with the cam $a^{13}$. The coiled spring $a^{14}$, connected at one end to the rack $a^9$ and at the other end to a fixed part of the machine, holds the arm $a^{12}$ in contact with the cam $a^{13}$. The rack $a^{10}$ with the finer ratchet-teeth is fixed and serves to retain the carriage $a^4$ and the stock in the advanced position.

Motion is imparted to the machine through the shaft *c*, which may be driven by means of a belt connecting a prime motor with the tight and the loose pulleys *c'*. The pulley $c^2$ is connected by a belt with the pulley *b'* on the arbor *b*. The belt $c^3$ connects the shaft *c* with the pulley $c^4$, which is connected with the shaft in the preferred construction by a clutch $c^6$, connected with mechanism, such as is shown in Fig. 1, whereby the pulley may be connected and disconnected. The shaft $c^5$ has the pinion $c^7$ engaging with and driving the intermediate gears $c^8$ and $c^9$, which are supported on studs, and through them communicates motion to the pinion $c^{10}$ on the cam-shaft *d*. The cam $a^{13}$ on the cam-shaft *d* controls the stock-feeding mechanism. The cam *d'* controls, through the arm $d^2$, the boring mechanism, consisting in the sliding frame $d^3$, provided with the chuck $d^4$, in which the drill $d^5$ is secured. The spring $d^6$ acts on the frame $d^3$ and holds the arm $d^2$ in contact with the cam *d'*, so that during each revolution of the cam *d'* the frame $d^3$ is made to reciprocate and carry the drill $d^5$ into and from the article.

On the end of the cam-shaft *d* the cam $d^7$ operates the block $d^8$, on which the cutter $d^9$ is adjustably secured. This cutter serves to separate the article from the stock. The spring $d^{10}$ is secured to and moves with the block $d^8$. It is bent to bear on the article and discharge the finished article as soon as it is separated from the stock by the cutter $d^9$. A stud on the face of the cam $d^7$ connects, by means of the connecting-rod $d^{11}$, the cam with the arm $d^{12}$. This arm is pivotally secured at its lower end to the end of the bed

$a'$. The tool-post $d^{13}$ is adjustably secured to the upper part of the arm $d^{12}$, and the tool $d^{14}$ is secured in the tool-post.

At each revolution of the cam $d^7$ the cutter $d^9$ and the block $d^8$ are vertically reciprocated and the arm $d^{12}$ is swung toward and from the stock, so as to fashion and separate one of the articles at each revolution of the cam-shaft. In the preferred form the block $d^8$ is provided with the spring-arm $d^{15}$, which is secured to the fixed bracket $d^{16}$ and serves to hold the block against the cam $d^7$ and also to guide the block $d^8$.

The hopper in which the stock is deposited consists of the two longitudinal bars $e$ $e$, each provided with a series of arms $e'$ $e'$, extending obliquely to form the hopper. (Shown in Fig. 3.) The bars $e$ $e$ are adjustably secured in the upper part of the brackets $e^2$ $e^3$, the lower arms of which are adjustably secured to the ways $a^3$ $a^3$, both the vertical and the horizontal arms of the brackets $e^2$ $e^2$ being provided with slots through which the screws by which they are secured extend, as is shown in Figs. 1 and 4. The bars $e$ $e$ are placed a sufficient distance apart to permit of the passage of the pusher $a^5$ and form the sliding support of the piece of stock to be operated upon, which is separated from the rest of the stock in the hopper by the plates $e^3$ on the levers $e^4$, which are pivoted on the posts $e^5$ $e^5$, secured to one of the ways $a^3$. The ends of the levers $e^4$ are connected with the bar $e^6$, one end of which is connected by means of the coiled spring $e^7$ with a fixed part of the machine. The other end of the bar $e^6$ is pivotally connected with the lever $e^8$, pivotally secured at the opposite end to a post secured to the opposite way $a^3$.

When the piece of stock operated upon has been pushed into the tubular arbor $b$ and the carriage $a^4$ is returned to the point of starting, as shown in the drawings, the post $a^6$ encounters and swings the lever $e^8$ into the position shown in solid lines in Fig. 4, thereby swinging the plates $e^3$ outward and allowing the stock to descend in the hopper and one piece of stock to rest on the bars $e$ $e$. As soon as the carriage moves forward the lever $e^8$ is released and the spring $e^7$ draws the bar $e^6$ and the levers connected thereto forward, swinging the plates $e^3$ $e^3$ over the lower piece of stock and supporting the rest of the stock in the hopper.

The carriage $a^4$ is provided with the lever $f$, pivoted in the carriage and provided at the heel end $f'$ with locking-notches into which a stop on the spring $f^2$ may enter to hold the lever $f$ in one of two positions. The lever $f$ is also provided with the pin $f^3$, projecting from each side of the lever under the pawls $a^7$ and $a^8$, and from the inner surface of one of the rack-bars the pins $f^4$ and $f^5$ project. As shown in Fig. 6 in solid lines, the lever $f$ has encountered the pin $f^4$ on the rear part of the rack-bar and moved the lever to allow the pawls to engage with the racks, and it has also moved the heel $f'$ of the lever from the engagement of the stop of the spring with one notch to the other. The spring will now hold the lever in this position until at the last forward movement of the carriage $a^4$ and the pusher the lever $f$ engages with the pin $f^5$, and is thereby swung to raise the ends of the pawls from engagement with the racks and lock the lever by the stop of the spring $f^2$ entering the other notch of the heel, as is shown in Fig. 6 in broken lines. As soon as the pawls are lifted off the racks the weight $f^6$, connected by a cord to the carriage $a^4$, draws the carriage back to the position shown in solid lines in Fig. 6.

The tubular arbor $b$ is provided at one end with the funnel-shaped end $b^2$ for the insertion of the stock and at the other end with the perforated cap $b^3$, the opening in which corresponds with the diameter of the stock. It has near the cap $b^3$ the sleeve $b^4$, provided with a series of radial spring-clamps, by which the stock is firmly clamped, so as to rotate with the arbor. The longitudinally-extending springs $b^5$ serve to hold the stock in the axial center of the tubular arbor in its passage through the same.

In the operation of the machine the pieces of stock placed in the hopper pass one by one to the bars $e$ and are automatically pushed into the tubular arbor. As soon as the rear end of one piece reaches the arbor the carriage is drawn back by the weight $f^6$ and another piece of stock is pushed forward against the one in the arbor, and so on as long as the machine is in operation and stock is in the hopper. At each revolution of the cam-shaft $d$ the cam $a^{13}$ acts to move the carriage $a^4$ and the stock forward a length sufficient to form one article. The cam $d'$ operates the drill-frame to bore a hole into the article if such a hole is required. If not, the arm $d^2$ is disconnected from the cam $d'$. The cam $d^7$ operates the cut-off cutter and the discharge-spring, while it also acts to swing the arm $d^{12}$ to bring the tool $d^{14}$ in contact with and shape the article.

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

1. In an automatic turning-lathe, the combination of the following instrumentalities: a revoluble tubular arbor, clamping-springs in the arbor, a hopper, a sliding carriage, a pusher on the carriage extending into the hopper to feed the stock, a hinged arm, a tool-post on the arm, a tool in the tool-post, a vertically-moving cutter for separating the work, and mechanism comprising a cam-shaft the cams on which control the stock-feeding devices, the operation of the shaping-tool and the separating-cutter; whereby the stock is automatically supplied, fed, turned and separated, as described.

2. In a machine of the nature described, the combination with the hopper having two bars for supporting the stock operated upon, of a sliding carriage, a pusher on the carriage,

two pawls pivoted to the carriage, a fixed rack having fine ratchet-teeth with which one of the pawls engages, a reciprocating rack having coarser teeth with which the other pawl engages, mechanism comprising a cam, and a connection between the cam and the reciprocating rack; whereby at each revolution of the cam a predetermined length of stock is moved forward to be shaped into the desired article, as described.

3. In a machine of the nature described, the combination with the stock-feeding mechanism comprising a carriage having a pusher and pawls engaging with rack-bars, the revoluble tubular arbor, and the cam-shaft, of the cam $d'$, the sliding frame supporting the drill, a connection between the sliding frame and the cam $d'$, and a spring acting to hold the sliding-frame connection in contact with the cam $d'$; whereby the stock advanced by the feeding mechanism may be drilled, as described.

4. In a machine of the nature described, in combination, a hopper adapted to support a supply of stock, plates acting to support the reserve stock and permit the piece of stock to be operated upon to be fed to the shaping-tool, a tubular arbor, a feeding device comprising a carriage having a pusher and pawls engaging with rack-bars, a sliding frame supporting a drill, a swinging arm supporting a shaping-tool, a block supporting a separating-cutter and a discharging-spring, and mechanism comprising a cam-shaft and cams for operating the parts, whereby articles may be turned, separated and discharged automatically, as described.

5. In a machine of the nature described, the combination with the revoluble tubular arbor and the hopper supporting the stock-supply, of a cam-shaft, the cam $a^{13}$, the cam $d'$ and the cam $d^7$ on the cam-shaft, connections with the cams and the stock-feeding mechanism, the drilling mechanism, the shaping-tool, the separating-tool, and the discharging-spring, and mechanism, substantially as described, for operating the arbor and the cam-shaft, as described.

6. In a machine of the nature described, the combination with the tubular arbor revolubly mounted in bearings, of the funnel-shaped end $b^2$ at one end, the cap $b^3$ on the other end, the sleeve $b^4$, radially-disposed spring-clamps in the sleeve, and the longitudinal springs $b^5$, whereby the stock is rotated and held as it is presented to the shaping-tool, as described.

7. The stock-feeding device in an automatic lathe having a sliding carriage provided with pendent pawls engaging with two rack-bars, in combination with stop-pins on one of the bars and an arm pivoted in the carriage, the heel of the arm provided with locking-notches connecting with a spring-stop, pins projecting from the arm under the pawls, and a weight connected with the carriage, whereby the carriage is held in each advanced position and released at a predetermined point to automatically return to feed the succeeding piece of stock, as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HENRY W. CARTER.

Witnesses:
J. A. MILLER, Jr.,
B. M. SIMMS.