No. 650,175. Patented May 22, 1900.

J. H. HASKINS.

MACHINE FOR OPERATING ON ENDS OF METAL BLANKS.

(Application filed Aug. 4, 1899.)

(No Model.) 5 Sheets—Sheet 1.

Fig. 1

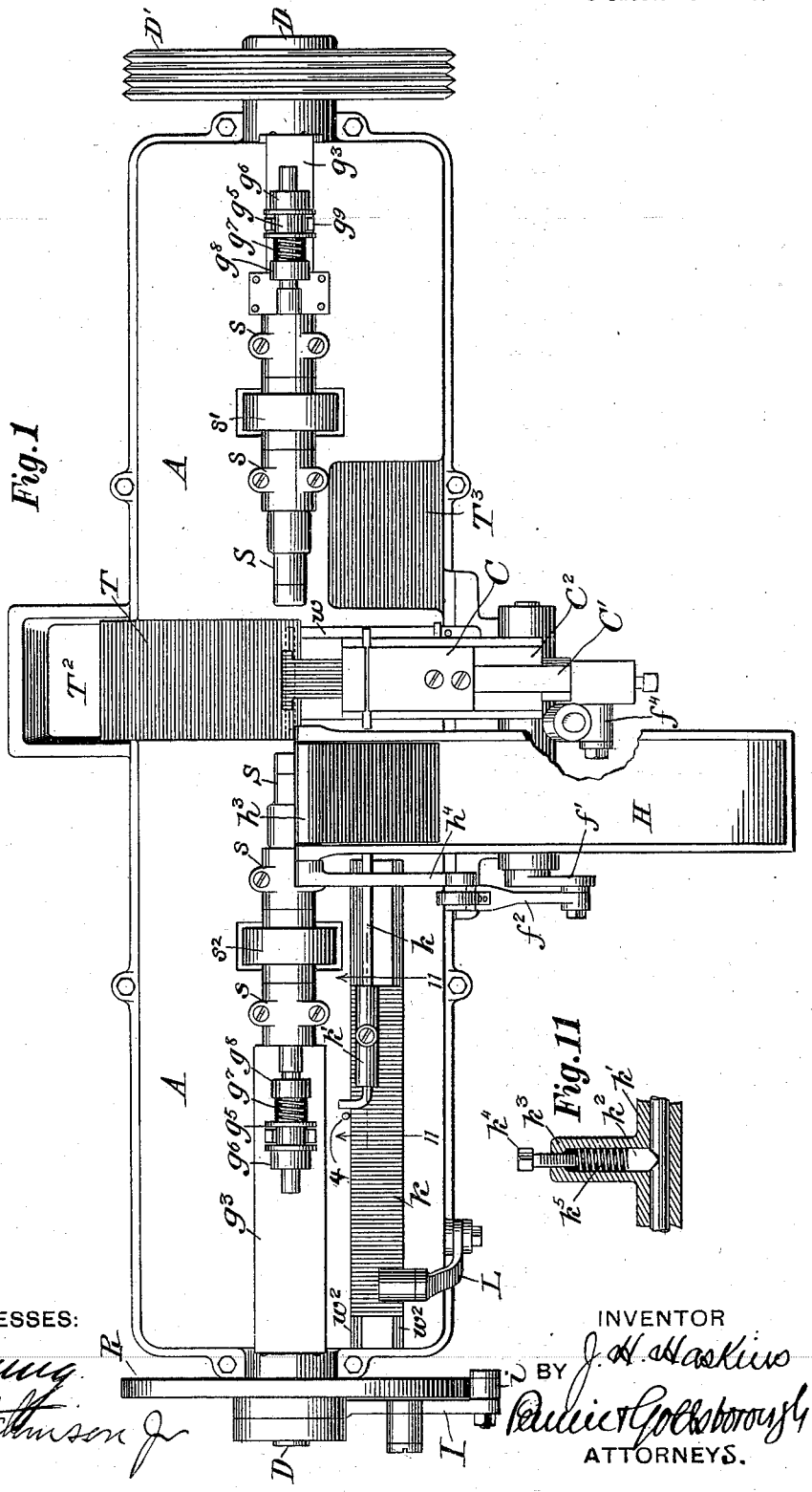

Fig. 11

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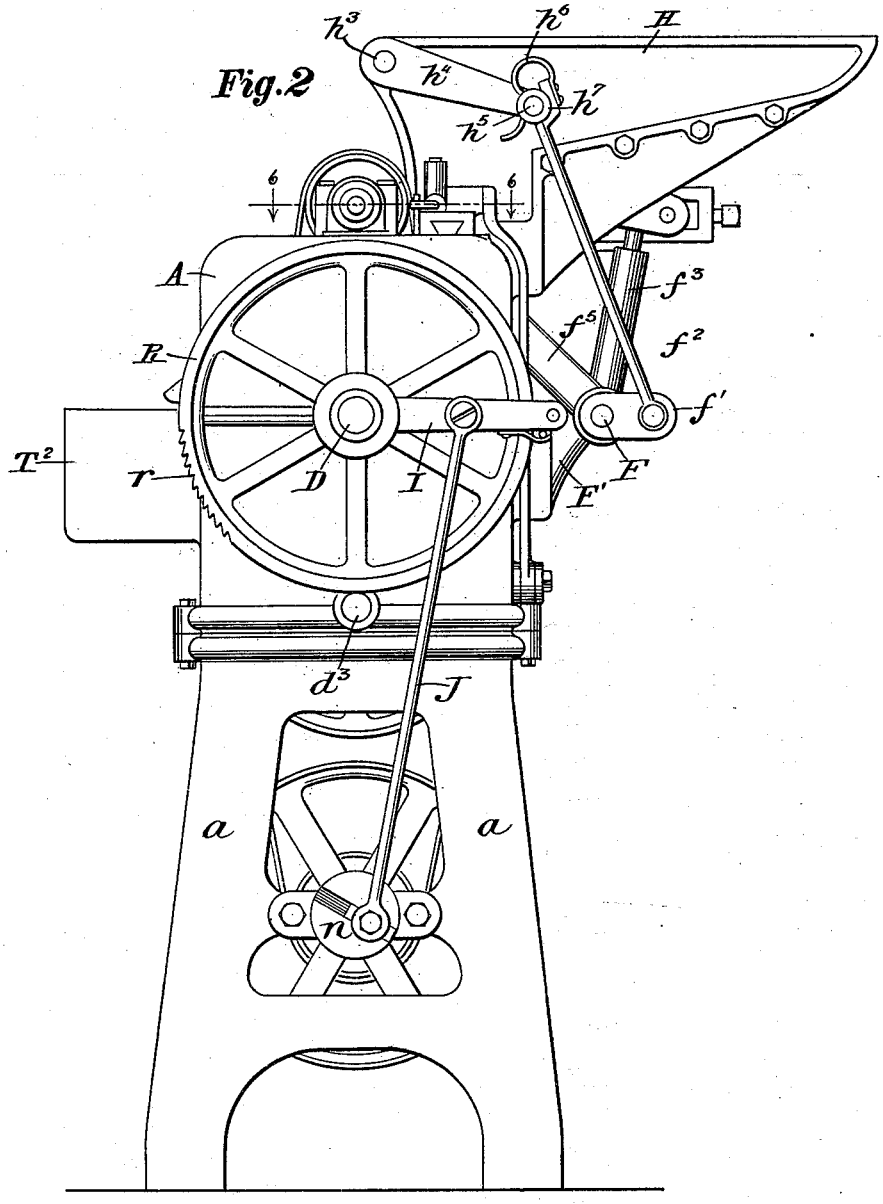
(No Model.) (Application filed Aug. 4, 1899.) 5 Sheets—Sheet 2.

Fig. 2



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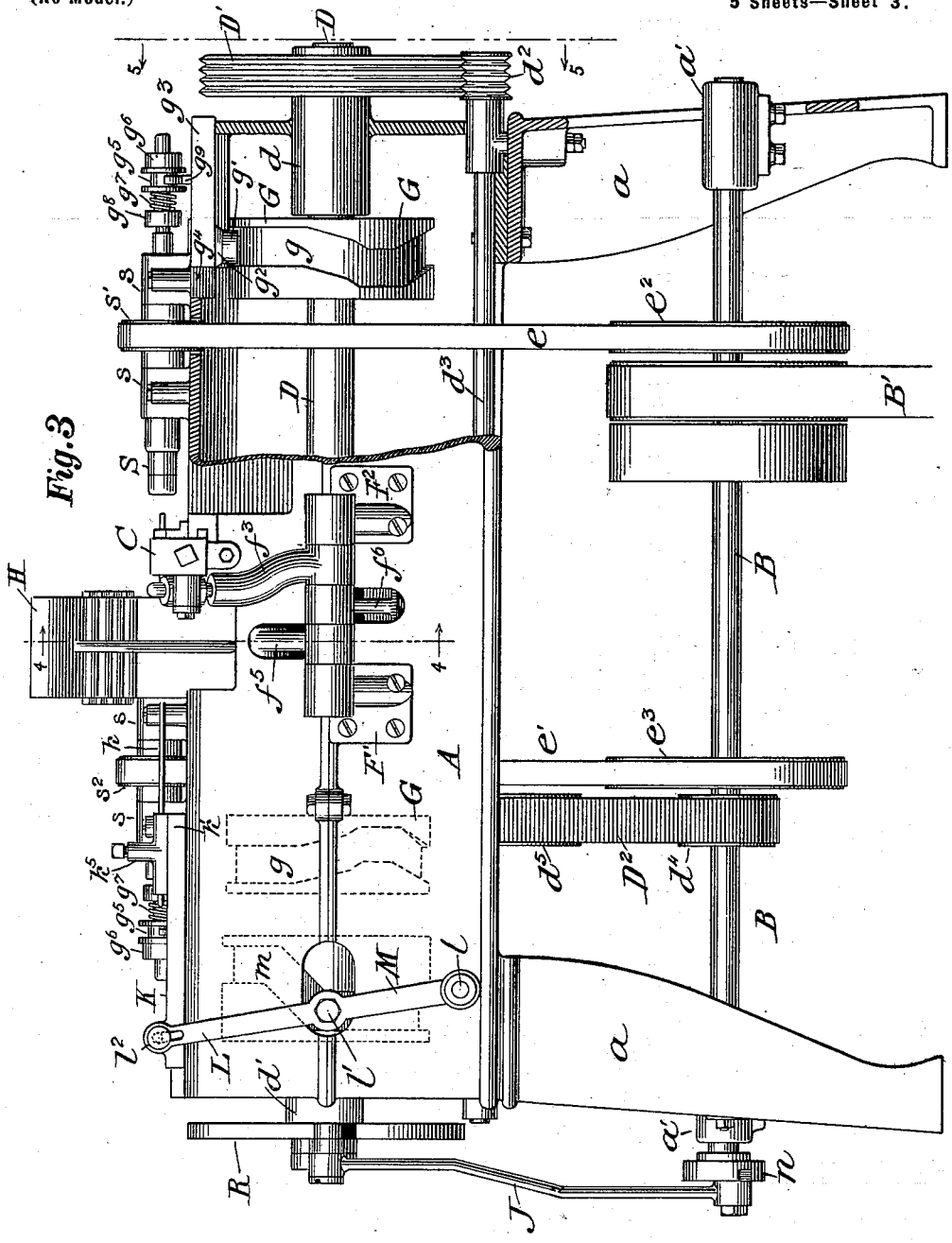
(No Model.) (Application filed Aug. 4, 1899.) 5 Sheets—Sheet 3.

Fig. 3



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(No Model.) (Application filed Aug. 4, 1899.) 5 Sheets—Sheet 4.

Fig. 5

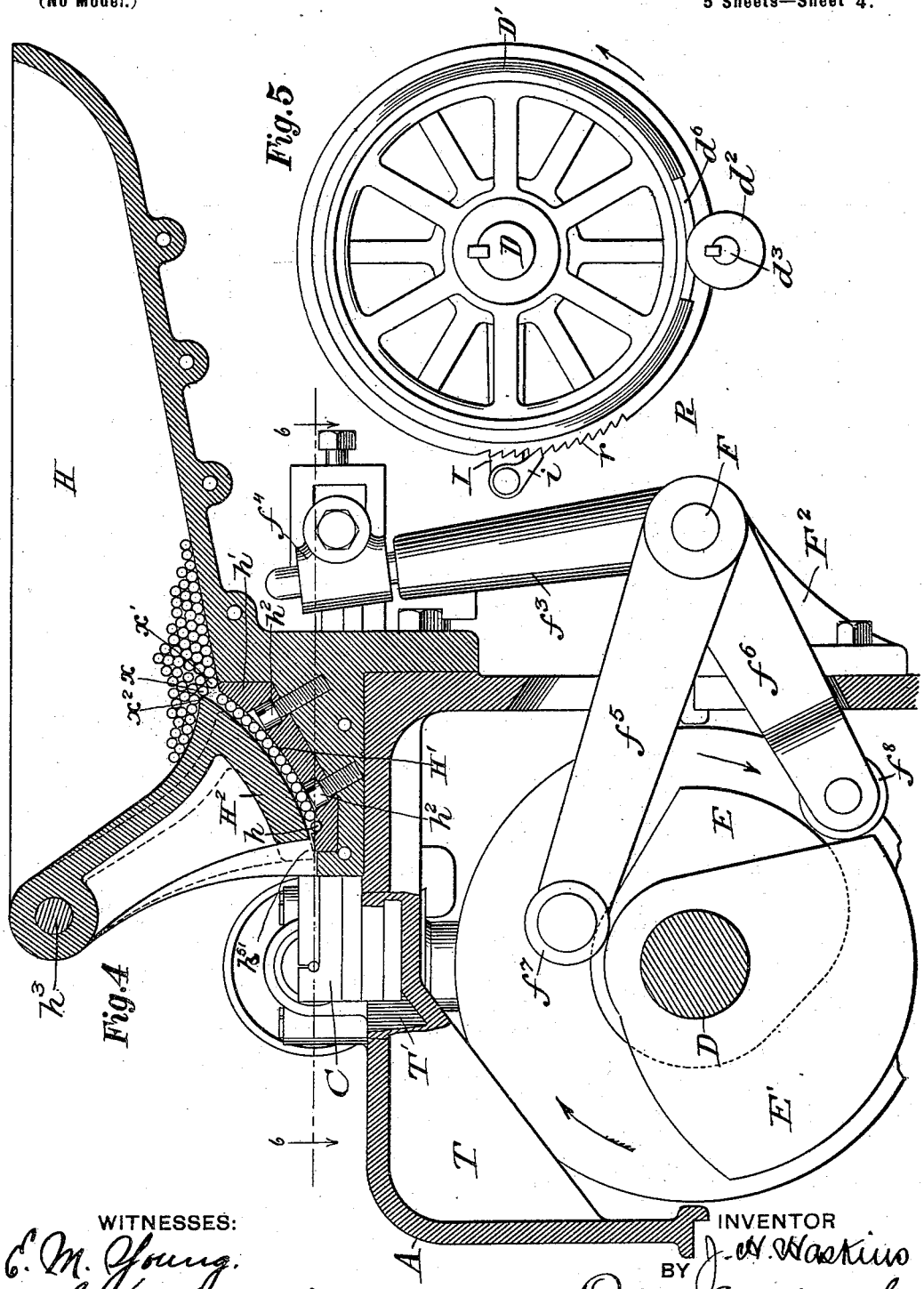

Fig. 4

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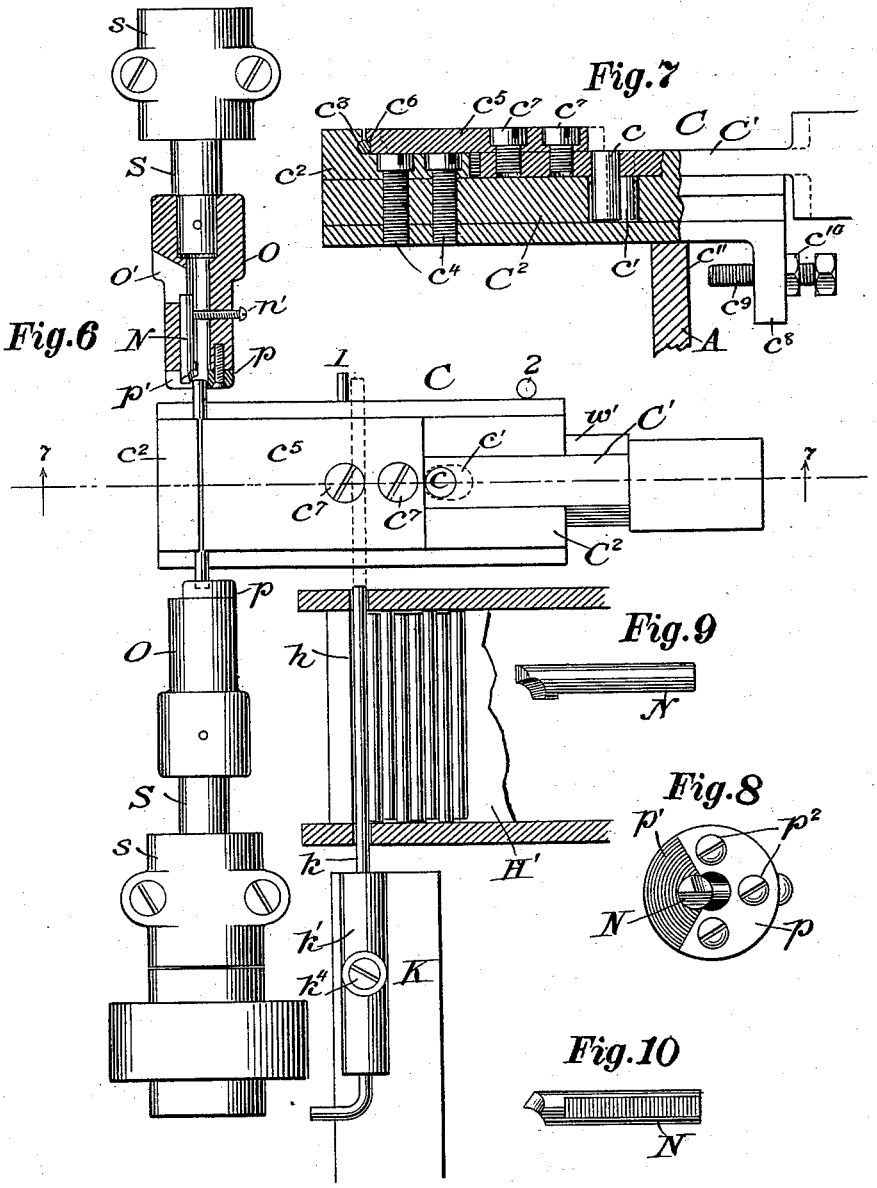

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UNITED STATES PATENT OFFICE.

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MACHINE FOR OPERATING ON ENDS OF METAL BLANKS.

SPECIFICATION forming part of Letters Patent No. 650,175, dated May 22, 1900.

Application filed August 4, 1899. Serial No. 726,071. (No model.)

To all whom it may concern:

Be it known that I, JAMES H. HASKINS, a citizen of the United States, residing in Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Machines for Operating on the Ends of Metal Blanks; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention has for its object to provide a machine for operating on the ends of metal blanks and the like, and though it has been designed with the particular object of beveling the ends of metal rods or bars forming roller-blanks for the bearings of mowers, reapers, and other agricultural machines it is not the intention to restrict its adaptation to such uses, as it is obviously capable of application to the turning, threading, beveling, or otherwise operating on the ends of all sorts of blanks.

The present invention has been designed to provide an economical machine of high power and speed for expeditiously operating on the ends of metallic blanks; and it consists in the organization and arrangement of parts hereinafter described, and whose novel features are more particularly pointed out in the claims.

The machine is illustrated in the accompanying drawings, to which reference will be made throughout the following description, and wherein—

Figure 1 is a plan view of the machine. Fig. 2 is an end elevation. Fig. 3 is a side elevation with a portion of the framing broken away and the actuating means for the movable hopper-ceiling omitted to more clearly show the parts beyond. Fig. 4 is a section on line 4 4 of Fig. 3 looking in the direction of the arrows. Fig. 5 is a detail view of the driving mechanism for giving to the tool-carrying spindles fast and slow longitudinal movement. Fig. 6 is a horizontal partly-sectional view on line 6 6, Fig. 4. Fig. 7 is a vertical sectional view of the carrier on line 7 7, Fig. 6, parts being shown in elevation. Fig. 8 is an enlarged detail end view of the spindle and tool. Figs. 9 and 10 are detail views of the cutting-tool. Fig. 11 is a detail view in section of the safety device for holding the ejector to its slide.

The frame of the machine may be of any suitable form and construction, but is here shown as consisting of a rectangular main body portion A in the form of a casing, with closed top and sides and supported by legs or uprights *a a*. Below the casing and journaled in suitable bearings *a' a'* on the uprights is the main driving-shaft B, which is driven by any appropriate means, as the belt B', from some suitable source of power. Mounted on the top of frame or casing are two oppositely-disposed tool-carrying spindles S S, between which reciprocates a carrier C for positioning the roller-blanks for the action of the tools, and adjacent to the carrier are the feed-hopper H and blank-ejector *k*, as will hereinafter be described. The tool-carrying spindles S S are mounted in any usual form of bearing *s s*, in which they have a rotary and a longitudinal movement, the rotary movement being derived from the shaft B through the belts *e e'*, running over pulleys e^2 e^3 on the shaft B and pulleys *s' s*^{2} on the tool-carrying spindles, and the longitudinal movement being obtained through the following mechanism:

Journaled in bearings *d d'* in the casing A is a cam-shaft D, having secured to one end a large friction-wheel D', running in frictional engagement with a small friction-wheel d^2 on a shaft d^3, which in turn is driven by a belt D^2 from the main driving-shaft B through suitable belt-pulleys d^4 d^5 on the shafts B and d^3, respectively. On the shaft D the actuating-cams G G, one for each tool-spindle, are mounted, and since they and their connections are the same in structure only one need be fully described. The cam G is provided with a groove *g*, in which travels a roller *g'*, mounted on a stud g^2, secured to a slide g^3, moving in suitable ways g^4 in the casing A. This slide is connected to the tool-carrying spindle by a yielding thrust-bearing in the following manner: A collar g^5 is loosely mounted on the spindle S between a fixed nut g^6 and a spring g^7, the opposite end of the spring resting against a fixed flange g^8 on the spindle. Embracing the yielding col-

lar g^5 thus provided is the bifurcated arm of a stud g^9, projecting upward from the slide. The flange g^8 may be and usually is formed as a nut and screw-threaded onto the spindle, whereby adjustment of the yielding force with which the tool is carried to its work may be secured. The movement of the slide g^3 under the action of cam G will carry the tool-holding spindle endwise with a speed in proportion to the rapidity of rotation of such cam, and in order that the efficiency of the machine may be increased the time given to a cycle of movements of the tool-carrying spindles must be reduced to the minimum, and this is partly secured by advancing the spindles rapidly until the tool begins to operate on the rod end, when they move more slowly during the cutting operation and have a correspondingly-rapid movement again when retreating or backing off. The rapid advance and rapid withdrawal of the spindles are secured from the drive-shaft B through the intermediacy of the belt D^2, shaft d^3, friction-wheels d^2 D', shaft D, cam G, and connections, as has been described. The slow advancing movement desired during the cutting operation is obtained as follows:

Rigidly secured to the shaft D is a wheel R, having a portion of its periphery provided with ratchet-teeth r. These teeth are engaged by a pawl i, carried on the end of an arm I, which is loosely mounted on the shaft D adjacent to the wheel R. The arm I receives vibratory motion from the main driving-shaft B through a crank n and connecting-rod J, and this crank is formed as a slotted disk or head, as shown in Fig. 2, for the purpose of adjusting the throw of the pawl, and thus giving greater or less motion to the wheel R and connected shaft D. The shaft D, cams G, and connected tool-carrying spindles receive motion from the driving-shaft B through two sources—viz., the friction-wheels D' d^2 and the wheel R and its ratchet-and-pawl connection, the former giving a rapid movement to the cams and connected tool-carrying spindles during the greater part of the revolution of the shaft and the latter imparting a slow movement thereto during the remainder of its revolution. During the actuation of the spindles through the latter of these mechanisms the other of such mechanisms must for the time being be disconnected, and this is accomplished by removing from the friction-wheel D' a portion d^6 of its peripheral surface, so that during the actuation of the shaft D and cams G by the ratchet-and-pawl mechanism and wheel R the friction driving-wheel d^2 has no engagement therewith, although both wheels continue to revolve, the wheel D' being driven at this time by the wheel R and ratchet and pawl and the wheel d^2 by the main driving-shaft, as before explained, until the mutilated portion of the friction-wheel D' has passed the driver d^2, when the friction-wheels reëngage and a rapid movement is again given to the parts. The mutilation of wheel D' is through a slightly-less arc than that of the ratchet-teeth on wheel R in order that the friction-surfaces of wheels D' d^2 may be brought into full engagement before the ratchet-and-pawl mechanism ceases to operate. When the wheel d^2 drives the shaft D, the ratchet simply slips over the smooth periphery of the wheel R.

The feed-hopper in which the blanks are placed is secured to the main frame or casing in any appropriate manner and is positioned with respect to the spindles S S, so that the blanks may be ejected endwise therefrom into a carrier, which delivers them sidewise between and into the grasp of the spindles. This hopper is formed with a sloping bottom to furnish a gravity feed for the blanks and has sufficient width to receive the blanks crosswise, as shown in Fig. 9. At the delivery end the hopper is provided with a chute H' of a size just sufficient to permit the entrance and passage of a single row of blanks, and the outer end of the chute is closed by an abutment h^{51}. Just inside this abutment the chute has a groove h, slightly enlarged and extended crosswise, and in line with this groove the side wall of the chute has an opening to permit the endwise removal of the rods one at a time by an ejector, as will be hereinafter described. The floor of the chute is preferably formed of a separate piece of hardened metal h', secured in place by appropriate means, such as bolts or screws h^2 h^2, so that in case it becomes worn it can be readily replaced.

It has been found in practice that when the floor and ceiling of the chute are both stationary the blanks or rods do not readily pass into it, for the reason that two or more blanks often get into such positions at the mouth of the chute as to form an arch, as indicated at x x', Fig. 4, thus effectually preventing the entrance of any of the blanks. This difficulty has been overcome in the present invention by making the ceiling H^2 of the chute movable lengthwise thereof, and in the preferred construction shown such ceiling is formed by one end wall of the hopper, which is pivoted on a pin h^3, journaled in the side walls at the discharge end of the hopper. An arm h^4 is secured on one end of this pin outside the hopper and is connected to a crank f' on the shaft F by a connecting-rod f^2. Connection between the rod f^2 and the arm h^4 is made by means of a pin h^5 on the arm h^4, embraced by a stiff spring h^6, which normally holds the pin against a shoulder h^7 on the rod, but which upon undue resistance to movement of arm h^4 will yield to permit the arm to remain stationary.

It will be noticed that the floor of the chute H' is fixed and that the oscillating end wall H^2 of the hopper has its lower edge extended approximately the length of the chute and forms the ceiling thereof. The effect of this is that the oscillations of the end wall H^2 cause a slight rolling movement of the blanks

in the chute, and thereby insures a free and easy movement of blanks to the discharge end. It will also be apparent that should two or more blanks x x' become jammed at the entrance to the chute or get so positioned over its mouth as to form an arch and obstruct the entrance thereto the end x^2 of the wall H^2 in its falling or retreating movement will destroy the arch and allow the blank x to fall into the chute; also, that should such an obstructing arch be formed while wall H^2 is withdrawn, as indicated in dotted lines, Fig. 4, the next upward or forward movement of the wall will again break the arch and allow the blank x' to enter the chute. The ceiling H^2 of the chute is made in the arc of a circle whose center is the center of pivot-stud h^3.

Located opposite the space between the ends of the tool-carrying spindles S S, adjacent to the feed-hopper and in position to receive in its jaws the blanks from the rod-receiving groove h in the chute, is a carrier C. The function of this carrier is to receive the blanks from the chute one at a time in its jaws and carry them into position between the cutting-tools. It also holds the blanks during the cutting operation, and then removes them from between the tools and returns to its original position opposite the rod-receiving groove h to receive another blank and permit the next incoming blank from the hopper to push out the one which has been turned.

The carrier C slides parallel with the hopper in suitable ways w, forked crosswise in the frame or casing A, and consists of two members C' C^2, connected by V-ways w', so that they may have a limited sliding movement one upon the other. The amount of such movement is determined by a connection consisting of a pin c, secured to the upper member C', and an elongated slot c' in the other member C^2, in which the pin slides. Any usual devices for limiting this sliding movement may be employed, or the slot may be made in the upper member and the pin be secured to the lower member, without departing from the spirit of the invention. The lower member C^2 is provided with a jaw c^2 at its outer end having a concave seat c^3, said jaw being preferably separate from the member and secured thereto by suitable means, as screws c^4. The upper member is likewise provided with a jaw c^5, having a concave seat c^6 at its outer end. It is also preferably separate from the member C' and secured thereto by screws c^7. An obvious modification would be to have the jaws formed integral with the members C' C^2; but it is preferred to make them separate in order that they may be replaced by jaws of different sizes to accommodate blanks of various diameters or to renew the parts when they become worn or broken.

Secured to the lower member C^2 is a pin 1, projecting sidewise therefrom. On the complete withdrawal of the carrier this pin abuts against a stop 2, projecting upward from casing in the line of movement of pin. The object of these stops is to insure the opening of the jaws of the carrier and then release the rods and to form a positive abutment to stop the carrier in proper position to receive new rods from the hopper and prevent the momentum of the operating-levers from moving the carrier too far rearward. The carrier is reciprocated in the ways w to bring the blanks into the line of the tools by means of an arm f^3, connected at its end to the member C' by a knuckle or two-way joint f^4 and carried by a shaft F, which is journaled in suitable brackets F' F^2 on the side of the machine-casing. The arm f^3 is preferably formed as an arm of a bell-crank, the other two arms $f^5 f^6$ of which extend toward the shaft D and carry rollers f^7 f^8, which bear on the cams E E', mounted on the shaft, so that as the shaft revolves the cam E' throws the arm f^6 down and moves the carrier C into the line of tools, and the cam E raises the arm f^5 and withdraws the carrier C from the line of tools into position to release the blank and receive another from the hopper. Assuming the carrier C to be in its receiving position, the first effect of the cam E, acting through arms f^6 and f^3, is to move the upper member on the lower member to close the jaws firmly on the blank and then to move the entire carrier into position for the tools to act on the ends of the blank, which during this operation is firmly held between the jaws of the carrier. On the reverse movement the first effect is to open the carrier-jaws and then withdraw the carrier as a whole from the cutting position to the line of feed opposite the rod-receiving groove h in the chute H'. Should this movement not open the carrier-jaws, the stops 1 and 2 contact on the carrier, reaching the limit of its rearward movement, and the jaws are positively opened and the finished blank may be readily ejected by the incoming one as it is pushed out of the chute by the ejector.

The lower member of the carrier is provided with a downwardly-projecting flange c^8, through which is threaded a set-screw c^9, secured in any adjusted position by the nut c^{10}. On the inward movement of the carrier this bolt contacts with the machine-frame A at e^{11}, and thus the blank is more firmly clamped between the jaws, and the position of the carrier to bring the blank in correct position for the action of the cutters is accurately determined.

In suitable ways w^2, running transversely to the carrier on the frame or casing, there is mounted a slide K, carrying an ejector k in line with the rod-receiving groove h at the feed end of the chute. This slide is reciprocated from the shaft D through the intermediacy of a groove or track in the cam m, in which groove runs a stud l', carried by an arm L, that is pivoted at l and connected to the slide K by a pin and slot l^2. The ejector k is mounted upon the slide K in the sleeve

k', through which it passes and to which it is clamped by a wedge-shaped block k^2, entering a transverse groove in the ejector. The block is vertically movable in a hollow stud k^3 and is held in clamping position by the set-screw k^4 and spring k^5, interposed between the block k^2 and said set-screw, as shown in Fig. 11. Such construction will prevent breakage of parts should the ejector meet with undue resistance, as under such circumstances the block k^2 will be forced upward against the spring by the ejector, which will then slide harmlessly through the sleeve. A stop 4 on the casing limits the rearward movement of the ejector and restores or resets it in case it has been pushed rearward through the sleeve k'.

Each spindle at its tool-receiving end is provided with a tool-holding block O, and both spindle and block are longitudinally bored eccentrically to their center, as shown in Figs. 6 and 8, for the reception of the tool or cutter N, which is driven to place and securely held by a set-screw n'. The tool-holding block O in the rear of the tool-seat is slotted, as at O', to facilitate driving out the tool or cutter when desired.

In order that the end of the rod or bar may be supported against the cutting action of the tool, the tool-carrying block is provided on its face with a hardened metal disk p, having a segment or portion p' removed and being secured to the face of the block by any suitable means, as screws p^2 p^2.

A suitably-inclined shelf T T' is located in proper position to receive and carry the metal shavings or cuttings from the tools to a receptacle T^2, whence they may be readily removed, and a similar incline T^3 is in suitable proximity to the discharging position of the carrier to receive and direct the finished blanks from the machine.

The roller-blanks having been supplied to the hopper, the oscillating end wall forming the ceiling of the chute directs them to the enlarged rod-receiving groove one at a time and by its oscillations prevents the entrance to the chute becoming choked, as before described. The ejector enters the rod-receiving groove through an opening in the wall of the chute and pushes a blank therefrom out and into the jaws of the carrier. The carrier-jaws are then closed by the means described, and the carrier moves the blank forward into the line of the tool-carrying spindles, the blank being meanwhile firmly held by the jaws. The tool-carrying spindles are then moved toward each other to position the tool and operate upon the ends of the rods, as already described. This movement is at first rapid until the blanks are properly positioned and well within the grasp of the tools, when the movement is slower during the action. When the ends of the blank have been finished, the tool-carrying spindles are rapidly moved endwise away from the cutting position, and the carrier-actuating means then operates to open the carrier-jaws and to move the entire carrier into its retracted position opposite the rod-receiving groove h of the chute, where the unclamped and finished rod is ejected by the next blank that is pushed out of the chute by the ejector.

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

1. In a machine for operating on the ends of metal blanks and the like, the combination of a stationary hopper, a chute leading therefrom, a carrier located at one side of the hopper and having jaws to receive and grip the blanks between their ends for presenting them to the tool, the ends of the blank projecting from the sides of the jaws and an ejector for delivering the blanks endwise between the jaws of the carrier.

2. In a machine for operating on the ends of metal blanks and the like, the combination of a stationary hopper, a chute leading from the hopper and having a closed end and a side delivery-opening, a revolving tool located beyond and to one side of the chute, a reciprocating carrier moving along one side of the chute toward and from the tool for taking blanks from the chute and delivering them to the tool, an ejector on the opposite side of the chute from the carrier, said ejector being projected through an opening in the wall of the chute to push the blanks one at a time out of the delivery-opening into the carrier, and said carrier being provided with jaws to receive and grip the blanks between their ends and present them to the tool.

3. In a machine for operating on the ends of metal blanks, and the like, the combination of a hopper, a chute leading therefrom and having a closed end and a side delivery-opening, a revolving tool located beyond and to one side of the chute, a carrier for presenting the blanks to the tool, said carrier moving along one side of the chute toward and from the tool, an ejector on the opposite side of the chute adapted to be projected through an opening in the wall thereof and to push the blanks one at a time out the delivery-opening on the opposite side, and mechanism for operating the carrier to seize the blanks between their ends and carry them forward and hold them during the action of the tool.

4. In a machine for operating on the ends of metal blanks, and the like, the combination of a hopper, a chute leading therefrom and having a closed end and a side delivery-opening, a pair of revolving tools, a carrier having jaws to receive and grip the blanks between their ends for presenting them between the tools, said carrier moving along one side of the chute, and an ejector on the opposite side, said ejector being projected into the chute and operating to push the blanks one at a time out the delivery-opening on the opposite side into the carrier.

5. In a machine for operating on the ends of metal blanks and the like, the combination of a hopper, and a chute leading therefrom having a groove at its lower end to receive individual blanks, a delivery-opening in one wall of the chute in line with said groove, an abutment closing the outer end of the chute, and a movable wall forming the ceiling of the chute.

6. In a machine for operating on the ends of metal blanks and the like, the combination of a hopper, a chute leading from the hopper, adapted to receive the blanks sidewise therefrom, and having an abutment at its lower end and a side delivery-opening in the wall of the chute in line with said lower end through which the blanks are ejected endwise, and a movable wall forming one side of the chute and coöperating with the abutment to close the lower end of the chute.

7. In a machine for operating on the ends of metal blanks and the like, the combination of a hopper, a chute leading from the hopper, adapted to receive the blanks sidewise therefrom and having a groove and an abutment at its lower end, a side delivery-opening in the wall of the chute in line with said groove through which the blanks are ejected endwise, and a movable wall forming one side of the chute and coöperating with the abutment to close the lower end of the chute.

8. In a machine for operating on the ends of metal blanks and the like, the combination of a hopper, a chute leading from the hopper adapted to receive blanks sidewise therefrom and having a groove at its lower end, a side delivery-opening in the wall of the chute in line with the said groove through which the blanks are ejected endwise, an ejector adapted to move endwise in said groove, and a movable wall forming one side of the chute.

9. In a machine for operating on the ends of metal blanks, and the like, the combination of a hopper having a pivoted end wall, a chute leading from said hopper and having a fixed floor, the pivoted wall of the hopper having an extension of the width of the chute to form the ceiling of the same, and means for vibrating said ceiling lengthwise the chute.

10. In a machine for operating on the ends of metal blanks and the like, the combination of a hopper and a curved chute leading therefrom, the bottom wall of which is removable and provided with an enlarged groove to receive individual blanks, an abutment in the bottom wall closing the outer end of the chute, a pivoted end wall having a portion forming the ceiling of the chute curved to correspond to the curve of the bottom wall.

11. In a machine for operating on the ends of metal blanks, and the like, the combination of a pair of oppositely-disposed, rotating, tool-carrying spindles, means for simultaneously moving both of said spindles endwise toward each other rapidly to grasp the blank to be operated on, means for continuing said endwise movement of both of said spindles at a slower rate during the operation of the tools, and means for causing both of said spindles to simultaneously rapidly recede from each other at the completion of their operation to release the blank.

12. In a machine for operating on the ends of metal blanks, and the like, the combination of a rotating tool-carrying spindle, friction-gearing for moving the same rapidly endwise until the tools reach the cutting position, and positively-acting mechanism for continuing a slow endwise movement of the spindle during the operation of the tool.

13. In a machine for operating on the ends of metal blanks, and the like, the combination of a rotating tool-carrying spindle, a slide for moving the same endwise, a shaft carrying a cam for moving the slide, friction-gearing for rapidly driving said shaft during a portion of its revolution, and positively-acting mechanism for slowly driving the shaft during the remainder of its revolution.

14. In a machine for simultaneously operating on both ends of metal blanks and the like, the combination of opposing rotating tool-carrying spindles, slides for moving said spindles endwise toward and from each other, a shaft carrying cams moving said slides in opposite directions, frictional driving mechanism for imparting rapid motion to said shaft during a portion of its revolution, and positively-acting mechanism for imparting a slow motion to said shaft during the remainder of its revolution.

15. In a machine for simultaneously operating on both ends of metal blanks and the like, the combination of opposing rotating tool-carrying spindles, slides for moving said spindles endwise toward and from each other, a shaft carrying cams moving said slides in opposite directions, frictional driving mechanism for imparting rapid motion to said shaft during a portion of its revolution, and positively-acting mechanism for imparting a slow motion to said shaft during the remainder of its revolution, and provisions for rendering one of said mechanisms inoperative during the operation of the other.

16. In a machine for operating on the ends of metal blanks and the like, the combination of a rotating tool-carrying spindle, a slide for moving the same endwise, frictional gearing for imparting rapid movement to the slide, positively-acting mechanism for imparting a slow movement to the slide, and provisions for disengaging the frictional gearing during the operation of the positively-acting mechanism.

17. In a machine for operating on the ends of metal blanks and the like, the combination of a rotating tool-carrying spindle, a slide for moving the same endwise, a shaft carrying a cam for moving the slide, a friction-gear on said shaft having a portion of its frictional surface removed, a friction driving-wheel engaging said gear, mechanism for continuing the motion of the said shaft when the

removed portion of the friction-surface is passing the driving-wheel.

18. In a machine for operating on the ends of metal blanks, and the like, the combination of a rotating tool-carrying spindle, a slide for moving the same endwise, a shaft carrying a cam for moving the slide, a friction-gear on the shaft having a portion of its periphery cut away, a friction driving-wheel engaging said gear and a pawl-and-ratchet mechanism for continuing the rotation of the shaft when the cut-away portion of the gear's periphery is passing the driving-wheel.

19. In a machine for operating on the ends of metal blanks, and the like, the combination of a rotating tool-carrying spindle, a slide for moving the same endwise, a shaft carrying a cam for moving the slide, a friction-gear on the shaft having a portion of its periphery cut away, a friction driving-wheel engaging said gear, a disk on the shaft having a segment of ratchet-teeth, and a reciprocating pawl engaging the ratchet-teeth, said segment of teeth and cut-away portion of the friction-gear being relatively arranged so that when the shaft is rotated by the gear the teeth are not in a position to be engaged by the pawl, and when the pawl engages the ratchet the gears are out of engagement.

20. In a machine for operating on metal blanks, and the like, the combination with a chute, of a blank-ejector adapted to pass into the chute from one side, positively-operating mechanism for actuating said ejector, a yielding connection between the ejector and its operating mechanism, and a stop to reset the ejector.

21. In a machine for operating on the ends of metal blanks, and the like, the combination with a chute, of a blank-ejector adapted to pass into the chute from one side, said ejector consisting of a rod k, the sleeve k' embracing said rod, and the spring-pressed clamping-block k^2 yieldingly holding the rod against endwise movement.

22. In a machine for operating on the ends of metal blanks, and the like, the combination with a chute, of a blank-ejector adapted to pass into the chute from one side, said ejector consisting of the rod k, the sleeve k' the spring-pressed block k^2 yieldingly holding the rod against endwise movement, and the fixed stop k^4 to restore the rod to normal position after it has been moved.

23. In a machine for operating on the ends of metal blanks and the like, the combination of a hopper, having one of its end walls pivoted so as to vibrate, an arm on the pivot-pin of said wall, a rotary shaft having a crank-arm connected by a pitman with the arm on the wall's pivot-pin, and a yielding connection between the pitman and the arm.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES H. HASKINS.

Witnesses:
HERBERT F. PERKINS,
CHAS. W. ALLEN.