(No Model.)

4 Sheets—Sheet 1.

W. L. GROUT & E. L. BOWERS.

TURRET LATHE.

No. 445,694. Patented Feb. 3, 1891.

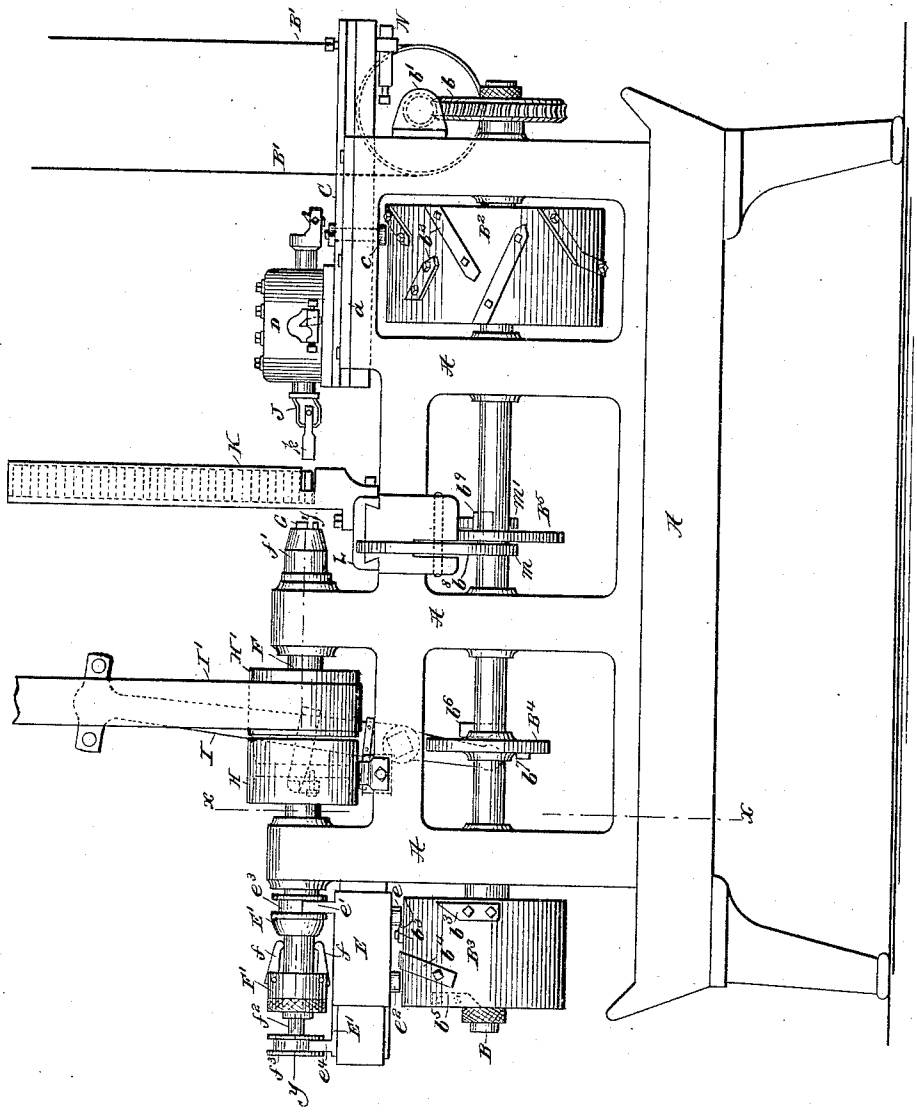

Fig. 1.

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(No Model.) 4 Sheets—Sheet 2.

W. L. GROUT & E. L. BOWERS.

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Fig. 2.

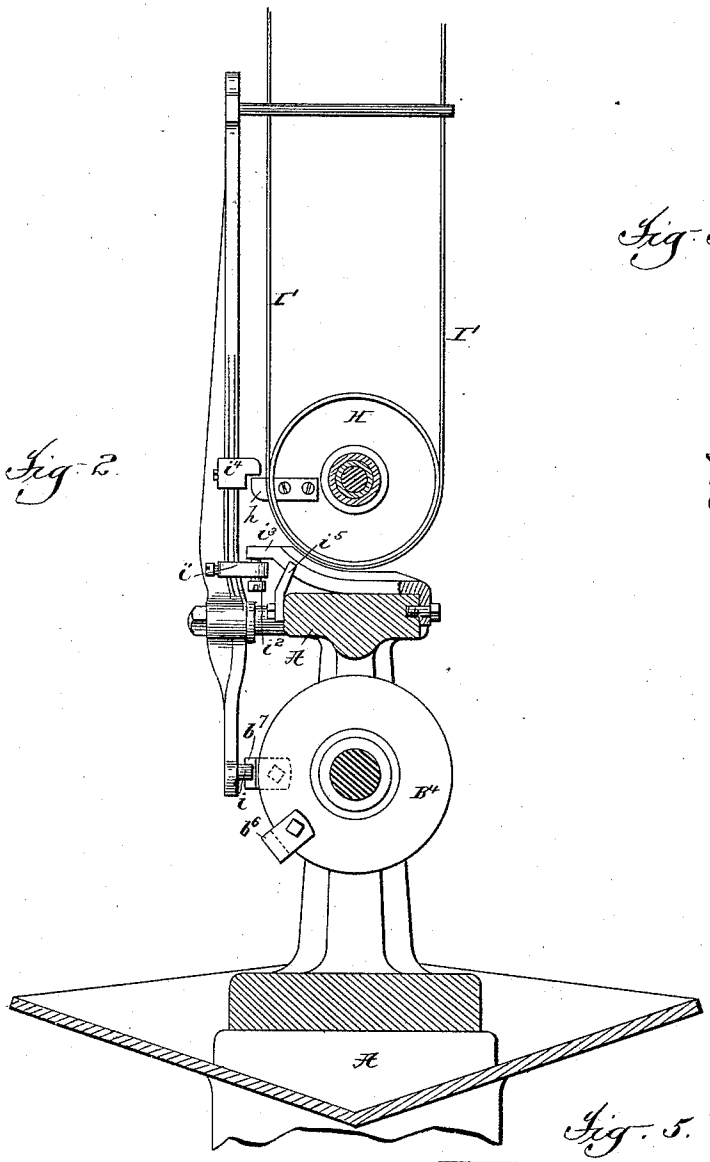

Fig. 3.

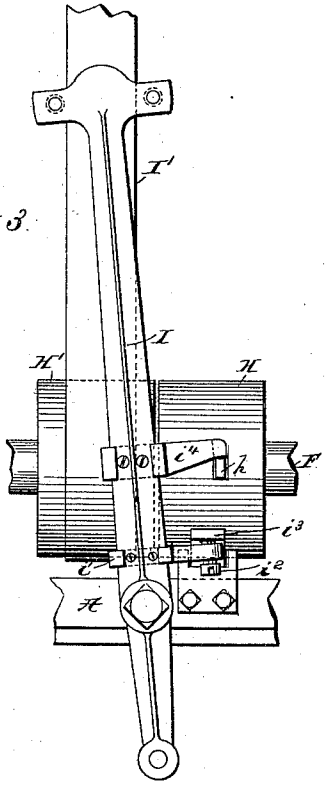

Fig. 4.

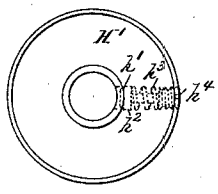

Fig. 5.

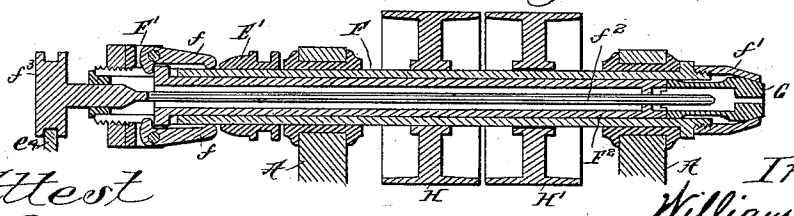

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Fig. 6.

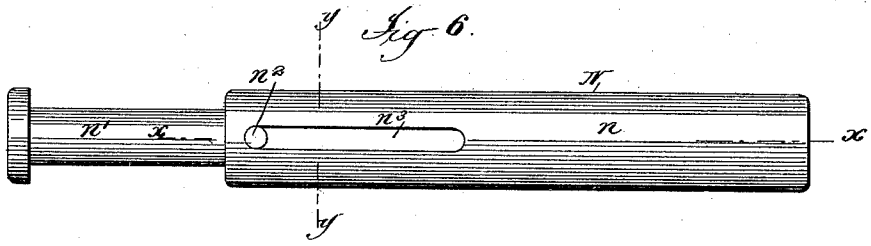

Fig. 7.

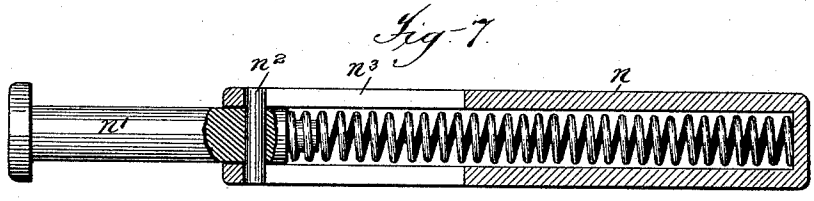

Fig. 8.

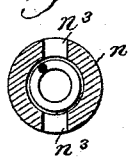

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Fig. 9.

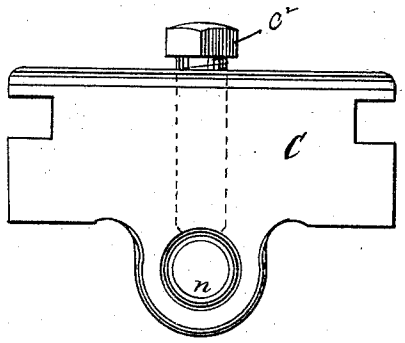
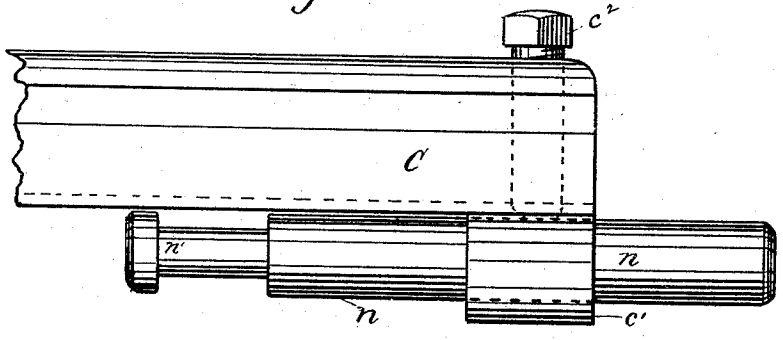


Fig. 10.



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UNITED STATES PATENT OFFICE.

WILLIAM L. GROUT AND EDWARD L. BOWERS, OF ORANGE, MASSACHUSETTS.

TURRET-LATHE.

SPECIFICATION forming part of Letters Patent No. 445,694, dated February 3, 1891.

Application filed May 24, 1890. Serial No. 353,013. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM L. GROUT and EDWARD L. BOWERS, citizens of the United States, both residing in Orange, county of Franklin, and State of Massachusetts, have invented a new and useful machine adapted for turning, drilling, or otherwise operating upon metal blanks or other pieces, of which the following description, taken in connection with the drawings herewith accompanying, is a specification.

Our invention consists, first, in the construction of a machine which as a whole has for its object the automatic operation or handling and presentation to the proper forming-tools of metal blanks, castings, forgings, or other pieces to be operated upon and shaped, and is more especially adapted (in the present instance illustrated) for the production of shuttles, pinions, or other parts for sewing-machines in a manner whereby the same may be placed in quantities in a suitable receiving-magazine and from thence be taken separately by suitable gripping apparatus, which places the same in a chuck to be operated upon while supported and held in the latter and when finished be automatically ejected therefrom, and, secondly, our invention in the present instance consists more particularly in the means for controlling the rotation of the chuck in a manner to conform to the mechanism operating in conjunction therewith, the latter being reserved for separate applications.

Referring to the drawings, Figure 1 represents a side elevation of a machine embodying our invention; Fig. 2, an enlarged sectional view through line $x\,x$ of Fig. 1, showing an end view of part of the elements forming the chuck and operating spindle-controlling mechanism; Fig. 3, an enlarged detail view showing part of the elements forming the chuck operating and controlling mechanism from the rear of the machine; Fig. 4, a side view of the loose pulley, showing friction-brake supported thereby; Fig. 5, a sectional view through line $y\,y$ of Fig. 1. Fig. 6 represents a side view; Fig. 7, a sectional view through line $x\,x$ of Fig. 6; and Fig. 8, a cross-section through line $y\,y$, Fig. 6, of the bunter or checking device detached from position on the turret-carriage; and Fig. 9 represents an end view, and Fig. 10 a side view, respectively, of the turret carriage, showing the manner of connection of the bunter therewith.

To explain in detail, A represents the supporting-frame; B, the main driving-shaft, adapted to be operated in the instance shown by the belt B′ through the medium of gearing b and b', and is provided thereon with cam-carrying pulleys B^2 and B^3 and cam-carrying disks B^4 and B^5. The cams b^2 on the pulley B^2 engage with an arm or stud c of a sliding carriage C, which latter is supported and guided in suitable ways $a\,a$ in the frame A to operate said carriage longitudinally and cause the tool-carrying turret D located thereon to be moved to and from position to enable the cutting, forming, or other tools supported thereby to operate upon the metal blank or other piece supported in the chuck G. In order to prevent the sliding carriage C when carried forward from moving at a greater speed than given by its operating-cams b^2 and render the tools supported in the turret carried by said carriage liable to breakage or other damage caused by a too quick or sudden engagement with the object to be operated upon, we provide a bunter or checking device N, which consists of a cylindrical supporting-shell n, provided with a spring-actuated rod or buffer n' projecting one end thereof, and retained in position therein by means of a pin or projection n^2, located on said rod or buffer, which extends and operates in a longitudinal slot or opening n^3 in said shell n, serving to guide and limit the movement of the rod or buffer. This bunter or checking device is, as more clearly shown in Figs. 9 and 10, adapted to be supported in an opening in a boss or projection c', formed integral with the under side of the turret-carriage, and be adjustably held in a stationary position therein by a set-screw c^2. At the forward movement of the turret-carriage and before it has moved to the end of its traverse or the tools presented by the turret thereon has engaged with the object held by the chuck the said buffer n' contacts with the frame A or part thereof and prevents the said turret-carriage from moving forward faster than its normal speed or that given by its operating-cams, for the purpose hereinbefore set forth.

When the turret-carriage has been carried to its proper limit, the collar on the end of the rod or buffer n' contacts with the adjacent end of the shell n and acts as a stop to prevent further movement of said carriage, as will be readily understood.

In order that the bunter or checking device may act as a stop to limit the movement of the turret-carriage sooner or later to allow for the different sizes of tools which may be carried by the turret or for different sizes of the objects to be operated upon, we adjust the relative position of said bunter with the turret-carriage by means of the set-screw c^2 in order that the bunter may stop the carriage at a greater or less distance from the chuck, as will be readily understood. It is obvious to those skilled in the art that the bunter may be secured on the frame A and the turret-carriage be provided with an arm or projection to engage with said bunter without departing from the spirit of our invention.

In order to make the object of our invention more clearly understood, we have also shown a gripping device (represented at J, the peculiar construction of which we reserve for the subject-matter of a separate application) which is supported in or by the turret D and adapted to be moved forward at the proper time by the cam b^2 on the pulley B^2 to grasp a metal blank or other piece (represented at k) located in a suitable magazine K, through an opening therein, and is then moved back, retaining said piece in its grasp, as shown in Fig. 1, in order to allow the magazine K to be moved laterally from the front of said gripping device, after which movement of the magazine said gripping device is again moved forward a sufficient distance to place said metal blank or other piece k supported thereby into a chuck G. The said magazine K is mounted on a cross-slide L, which is operated laterally to carry the magazine to and from position for the gripping-jaws to take the pieces k therefrom by means of levers m and m', operated by cams b^8 and b^9, respectively, located on the disk B^5. The chuck G is supported and operated by a hollow rotating spindle F, the latter being operated in the instance shown by a driving-belt I'. In order that the chuck may be stationary when the gripping-jaws are carried forward to place the metal blank or other piece carried thereby in the same or be rotated after said metal blank has been placed therein, we provide said spindle F with a tight and a loose pulley thereon, (represented at H and H', respectively,) and the said driving-belt is adapted to be shifted at the proper time from the tight to the loose pulley, or vice versa, according to whether it is desired to rotate or stop the chuck, by means of a belt-shifter I. Said belt-shifter I is centrally pivoted on the frame A, and at its upper end is adapted in the usual way for engagement with the belt, and at its lower end is provided with a projection i thereon, adapted to be alternately engaged at the proper time by the cams b^6 and b^7 on the disk B to vibrate the upper end of the belt-shifter and shift the driving-belt from one pulley to the other.

In order to stop the rotation of the chuck and its operating-spindle immediately, or nearly so, upon the shifting of the driving-belt from the tight to the loose pulley to allow the piece k held by the gripping device to be placed into said chuck, we provide a series of brakes and stop devices adapted to operate in a manner to slow and then stop the rotation of the spindle and thereby the chuck at the proper time to conform to the gripping device and other parts operating in conjunction therewith, as hereinbefore set forth.

First. In order to quickly slow the spindle when the driving-belt is shifted from the tight to the loose pulley, we employ a friction-brake i^3, which is located beneath the tight pulley H and secured at one end to the frame A or part thereof and at its opposite end is loosely supported when in a normal position away from contact with the pulley H upon a suitable arm or support i^5, projecting from the frame A. The said friction-brake is adapted to be raised into contact with the pulley H by the engagement therewith at its free end of a lever i', termed the "brake-lever," which is secured to the belt-shifter at right angles thereto and adapted to operate or engage with said friction-brake in a manner as follows: When the belt-shifter, which is pivoted to the frame A at a point about central between the tight and loose pulleys, is operated upon by one of its operating-cams to shift the driving-belt from the tight to the loose pulley, it is thrown at an angle, as shown in Fig. 3, and thereby elevates or raises the outer or free end of the brake-lever into engagement with the brake i^3 and throws the latter into contact with the face of the pulley H to quickly slow the latter. The engaging face of the brake i^3 is provided with leather or other suitable material to produce a greater friction, and the end of the brake-lever is provided with an adjusting-screw i^2 for engagement with the brake i^3, in order that the pressure of the brake upon the pulley may be adjusted to a greater or less degree. After the rotating spindle has been slowed by the brake i^3, as described, a second lever i^4, termed the "stop-lever," which is also secured on the belt-shifter I at right angles thereto, is brought into a position to engage with a projection h, forming a stop, located on the tight pulley H, to stop the rotation of the spindle and chuck at the proper time, for the purpose as hereinbefore set forth. The outer or engaging end of said stop-lever is bent at right angles to its length, as more clearly shown in Fig. 2, forming a projection which is brought into position to engage with the stop h only when the belt-shifter has been moved to its limit in shifting the driving-belt on the loose pulley. In order to keep the

stop h in contact with the stop-lever i^4, as described, and hold the chuck stationary while the piece held by the gripping device is inserted therein, we locate a friction-brake h' in the loose pulley H, as shown in Fig. 4, which is adapted to engage with the spindle F and cause the latter, by reason of the friction thus produced thereon, to keep the stop h on the pulley H in contact with the lever i^4, as will be readily understood, and for the purpose hereinbefore set forth. The said friction-brake h' consists of a suitable plate or disk h^2, provided with leather or other suitable material to produce a greater friction on its engaging surface, and is held in contact with the spindle F by means of a coiled spring h^3, which latter is held in position by an adjusting-screw h^4. By adjusting the latter, and thereby the tension of said coiled spring, the engaging disk h^2 may be caused to have a greater or less degree of pressure or friction against the rotating spindle F.

Referring to Fig. 5 of the drawings, we have shown a vertical sectional view of the machine through line $y\ y$ of Fig. 1 to more clearly show the chuck and connecting operating parts. The chuck, as shown, is connected with one end of a hollow shaft F^2, which is located within the spindle F. This shaft F^2 has a longitudinal movement within the spindle F and rotates with the same (engagement being secured by slot and counterpart connection) and is adapted to be reciprocated longitudinally therein to allow the jaws of the chuck to open or be closed by reason of their engagement with the shell f' in the usual way by means of pivoted elbow-levers f, which are adapted to engage with the rear end of the shaft F^2. Said elbow-levers f are pivoted in the head F′ of the spindle F and are adapted to be operated in the usual way by means of a sliding device E′, located on the spindle F and provided with a conical-shaped surface for engagement with the ends of the levers f and with an annular groove e^3, which is adapted to be entered by an arm or stud e', projecting from a sliding carriage E. (See Fig. 1.)

The carriage E is provided with a stud e on its under side, adapted to be engaged by the cams b^3 on the pulley B^3 to give the carriage E and the conical-shaped device E′ connected therewith a reciprocating movement for the purpose as hereinbefore set forth.

In order to eject the metal blank or other piece from the chuck after it has been operated upon, a rod f^2 is provided, which is supported centrally in suitable bearings in the hollow shaft F^2, and at one end extends adjacent to the chuck and at its opposite end projects beyond its supporting-shaft, and is provided with a hub f^3, having an annular groove in its periphery, which is engaged by an arm e^4, projecting from a reciprocating carriage E′, to move the rod f^2 forward at the proper time to eject the piece supported in the chuck therefrom and then withdraw the same to its original position. The said carriage E′ is supported and adapted to operate on the frame A or part thereof, and is provided on its under side with a stud e^2, which is adapted to be alternately engaged by cams b^5 and b^4 to cause the rod f^2 to be operated, as set forth.

The operation of the machine as a whole, in brief, is as follows: The metal blanks, castings, forgings, or other pieces to be operated upon are placed in quantities in the magazine K, which is moved to a position in front of the gripping device by means as hereinbefore set forth. The turret D is then moved forward by its operating-cams to cause the gripping device carried thereby to extend into the opening in said magazine and grasp one of the pieces therein, after which the turret is moved back, the gripping device retaining said piece in its grasp. The magazine is then moved laterally from its position in front of the gripping device, and the turret is again moved forward to cause the gripping device to insert the piece carried thereby into the chuck G, said chuck being stationary at the time of such insertion by means of the shifting of the driving-belt from the tight to the loose pulley and the action of the brakes and stop devices on the tight pulley, as hereinbefore set forth in detail. After the insertion of the metal blank or other piece into the chuck the driving-belt is shifted back to the tight pulley to rotate the chuck and piece supported thereby, and the turret is moved back and partially rotated in the usual way to bring one of the tools carried thereby into position to operate upon the piece rotated by the chuck when the turret is again moved forward. After the piece has been sufficiently operated upon by the cutting, forming, and other tools the chuck is again brought to a standstill and the piece is ejected therefrom by the push-rod f^2.

It is obvious that the time of action of the several parts to operate in relation to each other as described is secured by means of the arrangement, size, and location of the several operating-cams, which are all operated by the main driving-shaft B.

Having thus set forth my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a magazine-machine for carrying and presenting blanks to shaping tools, the combination, with a chuck and rotating spindle provided with a tight and a loose pulley, of a brake, a belt-shifter provided with a lever for engagement with said brake, and means for operating said belt-shifter, substantially as described, and for the purpose set forth.

2. In a machine for carrying and presenting blanks for shaping, provided with a magazine, gripping device, and chuck, the combination, with a rotating spindle provided with a tight and a loose pulley thereon, of a stop located on said tight pulley, a belt-shifter pro-

vided with a lever for engagement with said stop, and means for operating said belt-shifter, substantially as described, and for the purpose set forth.

3. In a magazine-machine, the combination, with a rotating spindle provided with a tight and a loose pulley, of a stop or projection located on said tight pulley, an automatically-vibrating belt-shifter provided with an arm or lever for engaging said stop or projection, and means for automatically vibrating said belt-shifter, substantially as described, and for the purpose set forth.

4. In a machine for carrying and presenting blanks for being shaped, provided with a magazine-gripping device for withdrawing blanks from the magazine, the combination, with a chuck and a rotating spindle provided with a tight and a loose pulley, of a stop supported by said tight pulley, a brake adapted for engagement with said tight pulley, a belt-shifter provided with a stop-lever and a brake-lever, and means for operating said belt-shifter, substantially as described, and for the purpose set forth.

5. In a machine for carrying and presenting blanks for being shaped, provided with a magazine and means for automatically withdrawing the blank therefrom, the combination, with a rotating spindle provided with a tight and a loose pulley, of a brake, a belt-shifter, a brake-lever supported by said belt-shifter and provided with an adjusting-screw for adjusting the action of said brake, and means for operating said belt-shifter, substantially as and for the purpose set forth.

6. In a magazine or other machine, the combination, with a rotating spindle provided with a tight and a loose pulley, of the said loose pulley, being provided with a friction-brake, and means for engaging said tight pulley to check its rotation and thereby the said rotating spindle, substantially as described, and for the purpose set forth.

7. In a magazine or other machine, the combination, with a rotating spindle provided with a tight and a loose pulley, of a friction-brake carried by said loose pulley for engagement with the rotating spindle, a stop or projection located on said tight pulley, and a belt-shifter provided with an arm or lever for engagement with said arm or projection, substantially as described, and for the purpose set forth.

8. In a magazine or other machine, the combination, with a rotating spindle provided with a tight and a loose pulley, of a brake and a belt-shifter provided with an arm or lever for engagement with said brake, substantially as described, and for the purpose set forth.

9. In a magazine or other machine, the combination, with a rotating spindle provided with a tight and a loose pulley, of a stop or projection located on and projecting from said tight pulley, and a belt-shifter provided with an arm or lever for engaging with said stop or projection to stop the rotation of said pulley and supporting rotating spindle, substantially as described, and for the purpose set forth.

10. The combination, with a turret-carriage and supporting-frame, of a spring-bunter or checking device adjustably supported in a fixed position on said carriage or part thereof and adapted to engage with the frame or part thereof to adjust the speed of and stop at the end of its throw the said turret-carriage, substantially as described, and for the purpose set forth.

11. The combination, with a turret-carriage and supporting-frame, of a bunter or checking device supported by said carriage, consisting of a supporting shell or frame and a spring-actuated rod or buffer projecting one end of said shell or frame, substantially as described, and for the purpose set forth.

12. The combination, with a hollow spindle provided with one or more slots, of a chuck or gripping device provided with a counterpart adapted to intersect with said slots, substantially as and for the purpose set forth.

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