J. M. WHITING.

Machine for Shaving and Nicking the Heads of Wood Screws.

No. 35,906. Patented July 15, 1862.

Fig. 1.

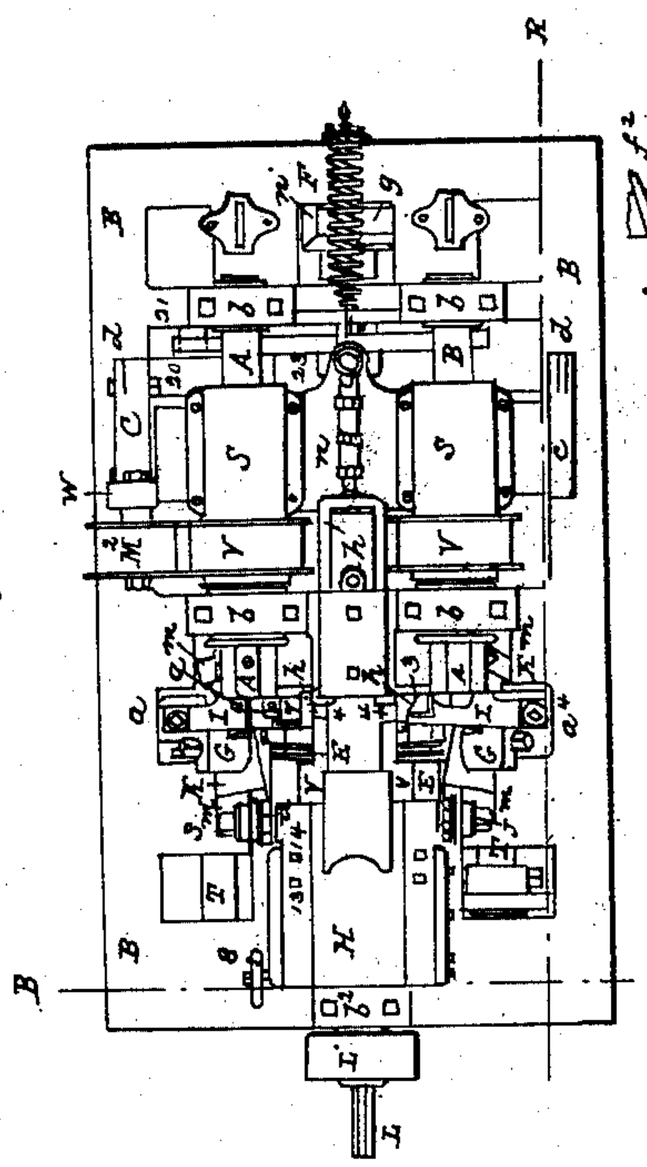

Fig. 2.

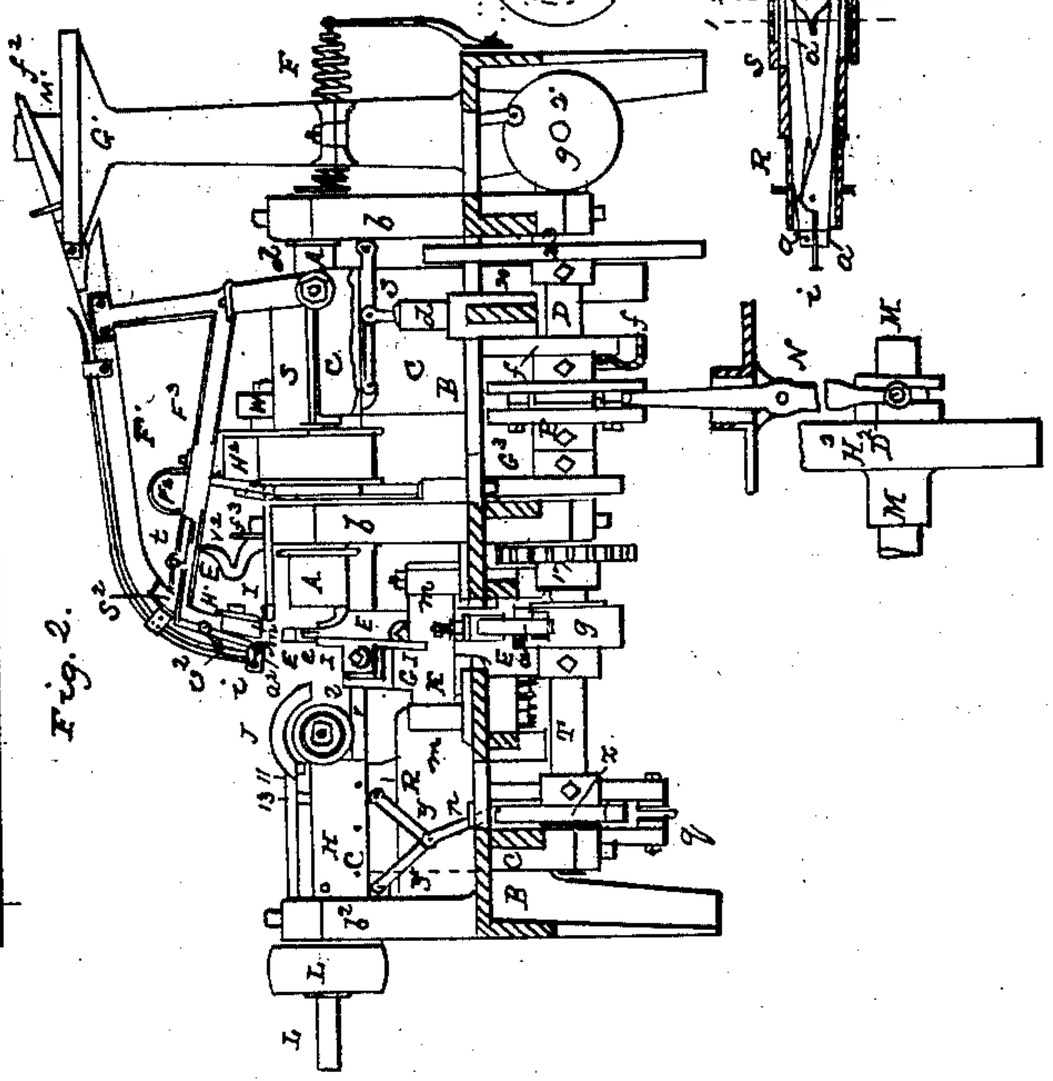

Fig. 3.

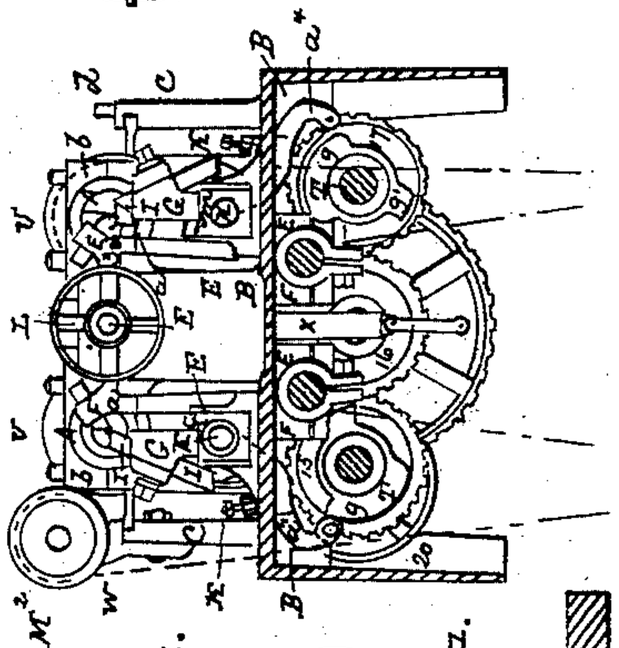

Fig. 4.

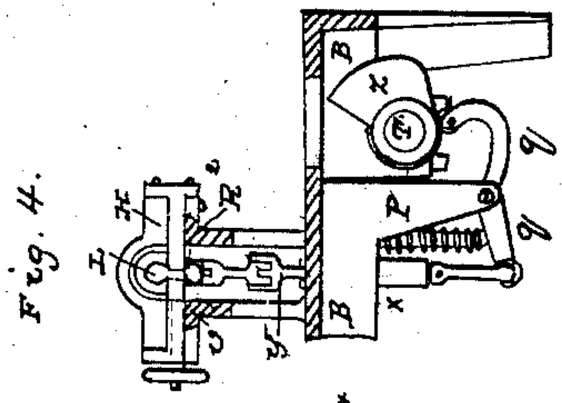

Fig. 5.

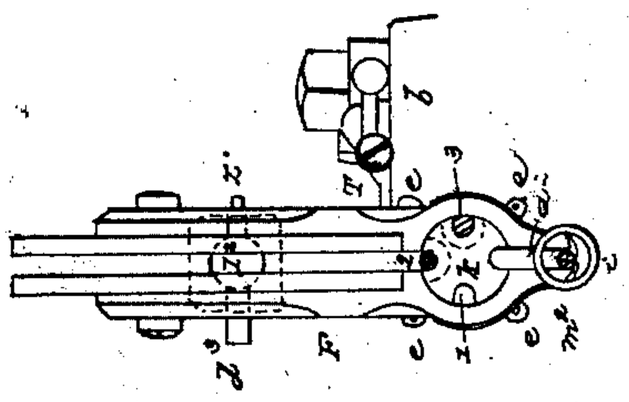

Fig. 6.

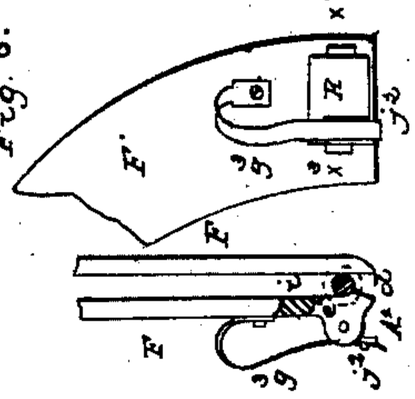

Fig. 7.

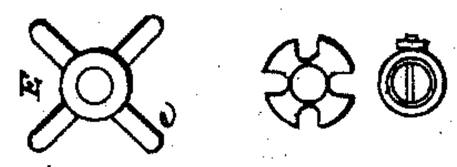

Fig. 10.

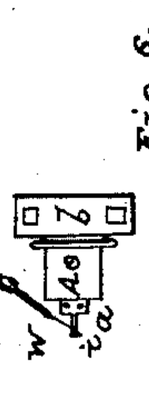

Fig. 11.

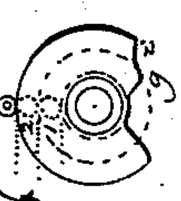

Fig. 12.

Witnesses:

Isaac Bissell
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UNITED STATES PATENT OFFICE.

JAMES M. WHITING, OF PROVIDENCE, RHODE ISLAND.

IMPROVEMENT IN MACHINES FOR SHAVING AND NICKING THE HEADS OF WOOD-SCREWS.

Specification forming part of Letters Patent No. **35,906**, dated July 15, 1862.

To all whom it may concern:

Be it known that I, JAMES M. WHITING, of Providence, in the county of Providence and State of Rhode Island, have invented a new and Improved Machine for Shaving, Nicking, and Burring the Heads of Wood-Screws; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawings, making part of this specification, in which—

Figure 1 is a plan of my machine. Fig. 2 is a side elevation and section by the line A A of Fig. 1. Fig. 3 is an end elevation and section through the line B B of Fig. 1, with the nicking apparatus removed to give an unobstructed view of other parts of the machine. Fig. 4 is an end elevation and section by the line C C of Fig. 2, showing the nicking apparatus by itself. Fig. 5 is a full-size front view of a portion of the apparatus for feeding screw-blanks to the machine, which is fully explained in the description. Fig. 6 is a front and side elevation of another device for the same purpose as that of Fig. 5. Figs. 7, 8, 9 are details of Fig. 5. Fig. 10 is a plan of the jaws of the nippers which hold and revolve the blanks, and the apparatus employed for removing the blanks therefrom after the operations are completed. Fig. 11 is a view of the nippers and the cam which opens and closes the same at the proper time, fully explained in the description.

Similar letters indicate corresponding parts in all the figures.

My machine is calculated to operate upon two blanks at a time, and to that end is provided with two spindles for revolving the said blanks, and with two sets of machinery for performing the successive operations upon the blanks, (one to each spindle,) it being ascertained that with the mode of operation employed two spindles may be operated conjointly with greater economy in many respects than singly, and independently of each other.

In Fig. 1 of the annexed drawings, A A are the two spindles, arranged parallel to each other upon a horizontal bed-piece, B, of cast-iron, and revolving in suitable bearings formed in the stands *b b b b*, upon said bed-piece, as shown. The blanks *i i* are held in the jaws *a a* of the nippers in the end of the spindle while the successive operations are being performed upon the heads of the same. These jaws are united in a hinge-joint at *c*, each having a tail-piece, *a' a'*, which extends toward the opposite end of the spindle in a slot formed therein for their reception, as seen in Fig. 11. The said jaws are made to close and seize one end of the blank *i*, when properly presented thereto, by means of a wedge, O, Fig. 11, which slides between and forces the tail-pieces *a' a'* of the jaws asunder, and the said jaws are opened to release the blank *i*, when the operation is completed, preparatory to receiving another blank, by withdrawing the said wedge from between the tail-pieces, thereby permitting their return to their former position by the force of a spring suitably arranged for the purpose. The said wedge is inclosed within and operated by the sliding sleeves S S, being attached to the collar j^3, which revolves in a recess formed in the interior of said sleeves, Fig. 11. The sleeves embrace the spindles, and are united by a web which has a bearing upon each side of the machine in suitable guides formed in the stands C C. This construction and arrangement of the jaws *a a*, and the means described for operating the same, including the wedge and sliding sleeve, it should be understood, have been previously employed for the purpose, and are not to be considered as a part of the invention herein claimed.

The sleeves S S are made to slide, in the performance of their specific functions, by means of the toggle-joint *s s s*, the vertically-sliding plunger *d*, and the cam *f*, upon the shaft D, Fig. 2, acting against the force of the spiral spring F, the said cam operating the said plunger through the medium of a roller, 1, upon a suitable stud projecting from the plunger, as shown. The sleeves are made to slide in the act of withdrawing the wedge O, by means of the spiral spring F.

It is apparent that the sliding movement of the sleeves, produced by the toggle-joint, operated, as shown, or in a similar manner, is positive, and that it has the peculiarity of closing the jaws quickly and acting most forcibly when the movement is nearly completed—that is, when the blank is seized by the jaws—and, further, that, in connection with the wedge O, it maintains this forcible grip without any effort on the part of the cam *f* to keep it in its position, and without any strain upon the

spindle, and it is this peculiarity of the toggle-joint in such connection which makes it the most suitable means for the purpose that, as far as I am aware, has hitherto been used, and it is this employment of the toggle joint to effect the sliding of the sleeve which forms the first feature of improvement in my machine. This toggle-joint serves a twofold purpose, as will presently appear.

The blanks *i i* are supported near the head while the successive operations are being performed by the back rests, *e e*, in the rocker-arms E E, upon the shafts *p p*. The back rests are pushed up against the blank, against the action of a spiral spring *r r*, encircling the shafts *p p*, at the proper time by means of the square sliding bars *h h*, which are provided with a roller in the end which rolls upon the inclined surface upon the projection 3 of the rocker-arm, Figs. 1 and 3, by the sliding movement of the said bars, and thereby facilitates the carrying of the rest up to the blank and the introduction of the square bar between the projection 3 and the fixed post 4 4, upon the frame or bed-piece B, to afford an unyielding and solid support to the rest after it has attained its position, as much so as if the said rest was actually a part of the fixed post itself, this result being particularly desirable for the purpose. The sliding bars, therefore, as arranged with the fixed post to operate the rocker-arm of the rest, form another feature of improvement in my machine.

The sliding bars *h h*, it will be seen, Fig. 1, are formed in one piece and are attached to the web of the sleeves S S by the connection *n* and stud *j*, the eye in said connection being somewhat elongated to provide for any slight difference in the time of movement of the said bars and the sleeves S S, both being operated by the same mechanism—the toggle-joint *s s*, the plunger *d*, and the cam *f*—and it is in this respect that the said mechanism serves a twofold purpose, as before remarked, which, as it dispenses with a separate mechanism and an independent operation, is especially desirable and useful, and forms another feature of my improvement.

That the nature and propriety of this joint movement of the sleeves which operate the jaws *a a* of the nippers with the sliding bars *h h*, which operate the back rests, *e e*, from one source of motion, (the cam *f*,) may be fully understood, I will further explain, by referring to Fig. 11, that the first swelling, *g*, of the cam *f* forces the wedge *o* between the tail-pieces *a' a'* of the nippers and grips the blank, the end of each tail-piece resting upon the plane surfaces 6 6, following the incline of the wedge, at the same time partially sliding the bars *h h*, and afterward completing the latter movement by means of the second swelling, *i*, of the cam *f*, which also slides the plane surface 6 6 between the tail-pieces, without, however, moving the latter, or in any way affecting the nippers. Thus by means of the two swellings of the cam, *g i*, and the plane surfaces 6 6 upon the wedge *o* the two devices are operated in conjunction from one source of motion.

The heads of the blanks *i i* are shaved by means of the tools I I in the rocking tool-posts G G upon the shafts K K, the said tools I I being formed as shown, and cutting upon both sides of the head, and the tools are inclined sufficiently from a perpendicular position to present the tools to the head in the required relative position to make them cut.

The shafts K rotate in bearings formed in the stands *m m*, and the tool I is moved up to shave the head of the blank against the force of a spiral spring inclosed in the shaft K, or a similar resistance by means of the cams *g g* upon the shafts T T', acting through the medium of the hinged tail-pieces a^4 a^4, projecting from the shafts K K, Figs. 2 and 3, and the position of the tool-posts relatively with their tail-piece is determined by means of the adjusting set-screws therein shown. This tail-piece, in combination with the rocking tool-post, thus arranged and operated, is especially useful for operating and determining the cut of the shaving-tool and forms another feature of improvement in my machine.

The nick or notch is cut in the head of the blank after the shaving operation is completed by means of the circular saws J J—one for each spindle—which are revolved by means of bevel-gears which connect the saw-shaft with the shaft L, the latter being revolved by the pulley L' thereon, which is driven by a belt from a pulley upon the main driving-shaft of the machine, as indicated by dotted red line in Fig. 3.

The saws are mounted upon a carriage, H, formed as shown in Figs. 1, 2, 4, which has a sliding movement upon suitable ways, *v v*, extending from the stand b^2, which forms a bearing for the shaft L, to the stands *b b*, and forms part of the bed-piece of the machine. The sliding movement which causes the saws to approach the head of the blank to cut the notch and to recede after the operation is performed, is produced by the toggle-joint *y y y*, the plunger *x'*, the lever *q*, and cam *z* upon the shaft T', Figs. 2 and 4, against the spring P^4.

It will be seen that the carriage H, Figs. 1 and 2, is necessarily removed at some distance from the head of the blank while the other operations are being performed to avoid interference therewith, and that it is desirable to bring the saws up quickly to the head at the appointed time, and to move only as fast as the saws cut after they come in contact with the head of the blank to be nicked; also, that the approaching movement be positive, that the nick may be cut exactly in the center of the head, and to prevent the saws from chattering.

For producing the desired movement, the toggle-joint, arranged and operated as described, is found exactly suited, and its use for the purpose forms another feature of improvement in my machine. In the use of the said toggle-joint for the purpose specified the

depth of the notch which the saws shall cut is determined by moving the joint-piece R upon the carriage toward or from the similar joint-piece upon the stand b^2. This is done by means of the hand-wheel 8, Figs. 1 and 4, the worm 10, and worm-wheel 12, Fig. 4, the latter operating a screw, which passes through the joint-piece R, and thus slides and fixes the latter in position by simply turning the hand-wheel 8. The saws are adjusted upon their shaft so as to cut in the center of the head by means of the nuts *u u*, and to their proper position vertically by means of the set-screw 11, the set-screw 13 serving to hold the saws in such position.

The shaft L, which drives the saws, slides horizontally in the hub of its driving-pulley with the movements of the carriage H, said pulley being provided with a collar formed upon the hub on the opposite side of the bearing from the pulley, to keep it in its place regardless of the movements of the sliding shaft L.

The burr formed upon the head of the blank by the nicking operation is removed by a second approach of the same tool which shaved the head, it being moved up to the head for that purpose by means of the smaller cams, *g' g'*.

In the performance of the successive operations of shaving, nicking, and burring, the mode of operation is that the spindles revolve steadily in one direction until the operation of shaving the head is completed, after which, without changing their position, but by simply stopping the spindles from revolving, the saws approach and perform the nicking operation, after which the spindles are again put in motion and the burring operation is performed by a repetition of the shaving operation, the only change in the condition of the spindles from revolving continually in one direction and in one position being that they cease to revolve during the nicking operation. This mode of operation greatly simplifies the machine and forms another feature of improvement in my machine.

The spindles are stopped and again started after the nicking operation is completed, by means of a friction clutch, D^2, operated by the shifting-lever N and the cam P upon the shaft D, which disconnects the pulley H^2 from the driving-shaft M and again effects the connection of the same to continue the operation.

The spindles are revolved in opposite directions by means of a belt from a pulley, H^2, upon the main driving-shaft M of the machine, which passes over the pulley M^2 upon a fixed stud projecting from the stand *w*, thence beneath the pulley U and over the pulley V to the driving-pulley again, as shown by the dotted red lines in Fig. 3. The cam-shafts D T T' beneath the bed-piece B revolve in bearings formed in stands which are pendent from and form a part of the same casting with the bed-piece, as shown in Figs. 2 and 4. The said shafts are connected in their movements by means of the three gears 15 16 17, and are driven by the pulley 20, the pinion 21, and the gear 23 upon the shaft D. The shaft D also drives the cross-shaft *g* by means of the bevel-gears *n' n'*. Upon each end of this cross-shaft is fixed a pitman, *l' l'*, which reciprocates a vertically-sliding carrier, M', connected with the said pitman by the shackle-bar S'. The office of the carrier is to select one or more blanks from a mass contained in the blank receptacle or hopper G' in the manner shown in Fig. 2, and transfer the same to the hinged prongs *f' f'* of the inclined railway F', in which they are deposited suspended by the head and are carried to the jaws *a a* of the nippers.

As the construction and operation of the blank-receptacle, carrier M', and the hinged prongs *f' f'* above mentioned are fully set forth in a separate application for a patent, a more exact description is unnecessary in this.

The inclined railway F' is hinged to an ear, *d' d'*, upon the stands C C upon each side of the machine, and there is one railway to each spindle, both operating simultaneously, the forward end descending to deposit a blank in the jaws *a a* of the nippers, and ascending out of the way while the blank thus deposited is being operated upon, the ascending and descending movements being produced at the proper time by the cam G^3 upon the shaft D acting through the medium of the vertically-sliding rod *h*.

In the forward end of the railway F' is placed a cylinder, *k'*, Fig. 5, having four (4) or more recesses formed therein of sufficient capacity to contain the body of one blank only, as shown in Fig. 5, at which point (the cylinder) the railway terminates. Attached to the cylinder *k'* is a star-wheel, E', Fig. 7, by means of which the said cylinder is revolved with an intermittent movement, when the railway ascends, by the arms *e' e' e' e'* of said wheel coming in contact successively with the click I', Fig. 5, which turns the said cylinder one-fourth ($\frac{1}{4}$) of a revolution, in doing which recess 1 takes the place of recess 2 and receives a blank from the railway; recess 2 takes the place of 3, holding a blank in reserve, as shown in red lines, and recess 3 takes the place of recess 4 and deposits its blank in the barrel a^2, wherein it is held in the proper position to be thrust into the jaws *a a* of the nippers. The end of the blank thus deposited in the barrel a^2 is thrust into the jaws of the nippers while they are revolving, by means of the pin x^2, (extending across the said barrel, as seen in Fig. 9,) the link *i*, Fig. 2, the lever w^2, the connecting-rod s^2, and a sliding piston inclosed in a barrel, J^2, Fig. 5, formed in the arm F^5 of the railway-frame, the said piston being actuated at the proper time by the spring P^2, and the piston is held back against the force of said spring by means of the latch *t* and the catch *z'*, Figs. 2 and 5, projecting from the said piston outside the barrel. The pin x^2 is placed in its proper position to receive and afterward drive the blank in the barrel a^2 into the jaws *a a* of the nippers, by

means of the finger V^2, upon the inclined surface of which the stud d^3, Fig. 5, slides by the ascent of the railway, which forces the piston back against the action of the spring P^2 until it is caught and held by the latch *t*, Fig. 2, as before explained. The sliding piston is released when by the descent of the railway F′ the barrel a^2, containing the blank next to be operated upon, arrives at the proper position for presenting the said blank to the revolving jaws *a a*, when the latch *t* comes in contact with and is lifted by the end of the fixed post f^3, which releases the piston and causes the pin x^2 to drive the end of the blank between the jaws of the nippers, in which position it is held until seized by said jaws, by means of the flat springs m^2 m^2, Fig. 5, upon the ends of which the body of the blank rests, as shown, which ends separate and release the blank when it has been seized by the jaws *a a*, by the ascent of the railway.

It will be seen that the blank in the barrel a^2 is thrust into the jaws *a a* of the nippers by the very act of carrying the said blank to the proper position to be presented to the said jaws, and it is this peculiarity in the mode of operation which distinguishes it from others in which the blank is thrust into the jaws of the nippers, or other device employed to hold and revolve the same, by a separate mechanism and an independent movement or operation. This mode of operation, whether resulting from the use of the mechanism described or some other, forms another feature of improvement in my machine.

It will be seen that the recessed cylinder *k′* in revolving, as described, by the movements of the railway takes one blank at a time from the column in the railway and holds the remaining blanks in the railway in reserve; also, that the same movement of the cylinder *k′*, in taking a single blank from the railway, also deposits a single blank in the barrel a^2, to be presented in turn to the nippers, and that the flat springs m^2 m^2, acting, in combination with this cylinder *k′*, upon a column of blanks as arranged in the said railway, serve to deliver the blanks composing such columns, one by one, to the jaws of the nippers, and when combined with the mode of operation above described for thrusting the said blanks into the jaws of the nippers, when delivered and presented thereto, insures a constant supply of blanks to the nippers as the operation of shaving, &c. proceeds. This combination, therefore, forms another feature of improvement in my machine.

In place of the recessed cylinder *k′* and the springs m^2 m^2, arranged and operating as described, for the purpose of presenting a single blank to the nippers and holding back the column of blanks in the railway, the device shown in Fig. 6 may be employed, which consists of a tumbler R^2, upon the pivot x^3 in the end of the railway upon one side thereof, which is held and returned to the position shown by the force of the spring g^3 acting against the foot-piece j^2 upon the said tumbler. When the blank *i″*, in the position shown, is seized by the jaws of the spindle and the railway ascends, the projecting portion *d* of the tumbler yields and releases the blank. At the same time the upper portion, *e*, of the tumbler falls inward, and, coming in contact with the succeeding blank, prevents it from descending until the tumbler resumes its position, as shown, and supports the column of blanks until another is to be supplied to the jaws of the nippers. This device, therefore, for the specified purpose forms another feature of my improvement.

The blank is removed from the jaws of the nippers, after the successive operations have been performed, by the force of a jet of water, W, directed obliquely against the under side of the head of the blank upon one side, as shown in Fig. 10, the said jet having the effect to destroy the centrifugal force imparted to the blank by the revolving spindle, as well as to push the blank from between the jaws *a a* by a force directed against the under side of the head, the said jet of water also being the means employed to produce a smooth cut and polish in the successive operations upon the head of the blank, though its employment for this purpose solely, it should be understood, is not new, the same being set forth in the expired patents of Sloat and Springsteen, dated March 30, 1837, and of Thos. W. Harvey, dated March 25, 1837. The use of a stream or jet of water solely for the purpose of producing a smooth cut and polish is therefore by me entirely disclaimed. This jet of water, as a means for removing the blank from the jaws of the nippers at the proper time, forms another feature of improvement in my machine, it being a simple and effective device for the purpose.

Having thus described the construction and particularized the points of improvement in my machine, the mode of operation is as follows: A sufficient number of blanks having accumulated in the railway F, by means of the mechanism shown in Fig. 2, or some other equally effective, the machine is started, when the railway F′ descends, carrying a blank in the barrel a^2 to the proper position and thrusts it into the jaws *a a* of the nippers, which jaws seize the said blank, and the railway ascends out of the way, in doing which another blank is deposited by the recessed cylinder *k′* in the barrel a^2, to be next fed to the jaws *a a*. Immediately following the seizure of the blank by the nippers the rests *e e* are brought up to their support in the manner before described, after which the shaving-tools I I are presented simultaneously to the two blanks, and the heads shaved smoothly to the required size and form, when the said tools are withdrawn, and at the same time the revolution of the spindles ceases by the action of the friction-clutch *k*, after which the saws are carried up to the heads and the notches cut therein. This being done the saws

recede out of the way, the spindles are again made to revolve, and the shaving-tools are moved up to the head a second time to remove the burr formed by the saws upon each side of the nick or notch, after which the shaving-tools are withdrawn, the jaws of the nippers are opened, and the blanks thus released are ejected therefrom by the jets of water which have been directed against the head during the performance of the successive operations. Another blank being supplied to the jaws of the nippers, the operation proceeds as before and thus continues.

Having described the construction and operation of my improved machine, what I claim therein, and desire to secure by Letters Patent, is—

1. The combination and arrangement of the sliding sleeves S S, the toggle-joint *s s s*, the plunger *d*, and cam *f*, substantially as described, for the purpose specified.

2. The sliding bars *h h*, in combination with the fixed posts 4 4, for operating the back rests, *e e*, substantially as specified.

3. The employment of the toggle-joint *s s s* for the twofold purpose of operating the jaws of the nippers which seize and hold the blank to be operated upon, and for operating the back rests, *e e*, which support the blanks therein while being operated upon, substantially as specified.

4. The combination and arrangement of the toggle-joint *y y y*, the plunger *x*, the lever *q*, the cam *z*, and the spring P^1, substantially as described for the purpose specified.

5. The combination and arrangement of the friction-clutch D^2, the pulley H^2, the shifting-lever N, and the two spindles A A, with a suitable belt or band for communicating motion to the said spindles, the same operating substantially as described, for the purpose specified.

6. The combination and arrangement of the pin x^2, the lever v^2, the sliding piston actuated by the spring P^2 and their connections, the latch *t*, the catch *z'*, and the fixed post f^3, for inserting the blank in the jaws of the nippers simultaneously with its arrival in the proper position to be received by said jaws, substantially as specified, and in combination therewith the finger V^2 and the stud d^3 upon the sliding piston for the purpose of placing the pin x^2 in the proper position to operate upon the succeeding blank, substantially as specified.

7. Though I do not claim, broadly, the use of the revolving cylinder *k'*, I claim the combination and arrangement of the railway F', constructed and arranged as described, the revolving cylinder *k'*, the flat springs m^2 m^2, and the barrel a^2, for the purpose specified, in connection with a suitable device for inserting the blanks in the jaws of the nippers, substantially as specified.

8. The tumbler R^2, arranged and operating in connection with the railway F', substantially as specified.

JAMES M. WHITING.

In presence of—
ISAAC A. BROWNELL,
ARNOLD PETERS.