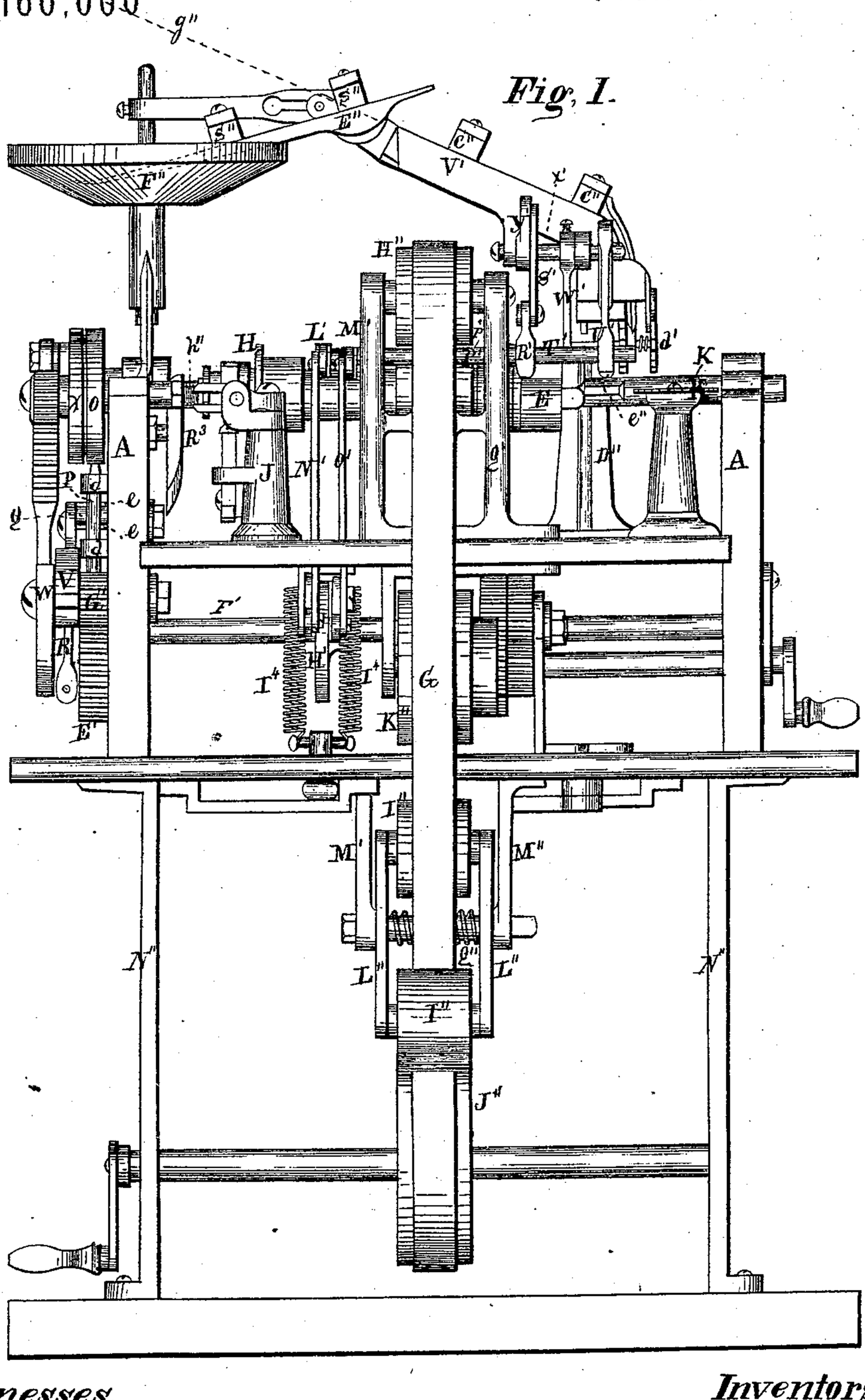
5 Sheets--Sheet 1.

# J. A. BIDWELL & J. N. B. JAQUITH.

## Machine for Shaving, Nicking and Re-shaving Wood-Screw-Blanks.

No. 160,000. Patented Feb. 23, 1875.

*Fig. 1.*




**Witnesses.**

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5 Sheets--Sheet 2.

# J. A. BIDWELL & J. N. B. JAQUITH.

## Machine for Shaving, Nicking and Re-shaving Wood-Screw-Blanks.

No. 160,000

Patented Feb. 23, 1875.

*Fig. 2.*

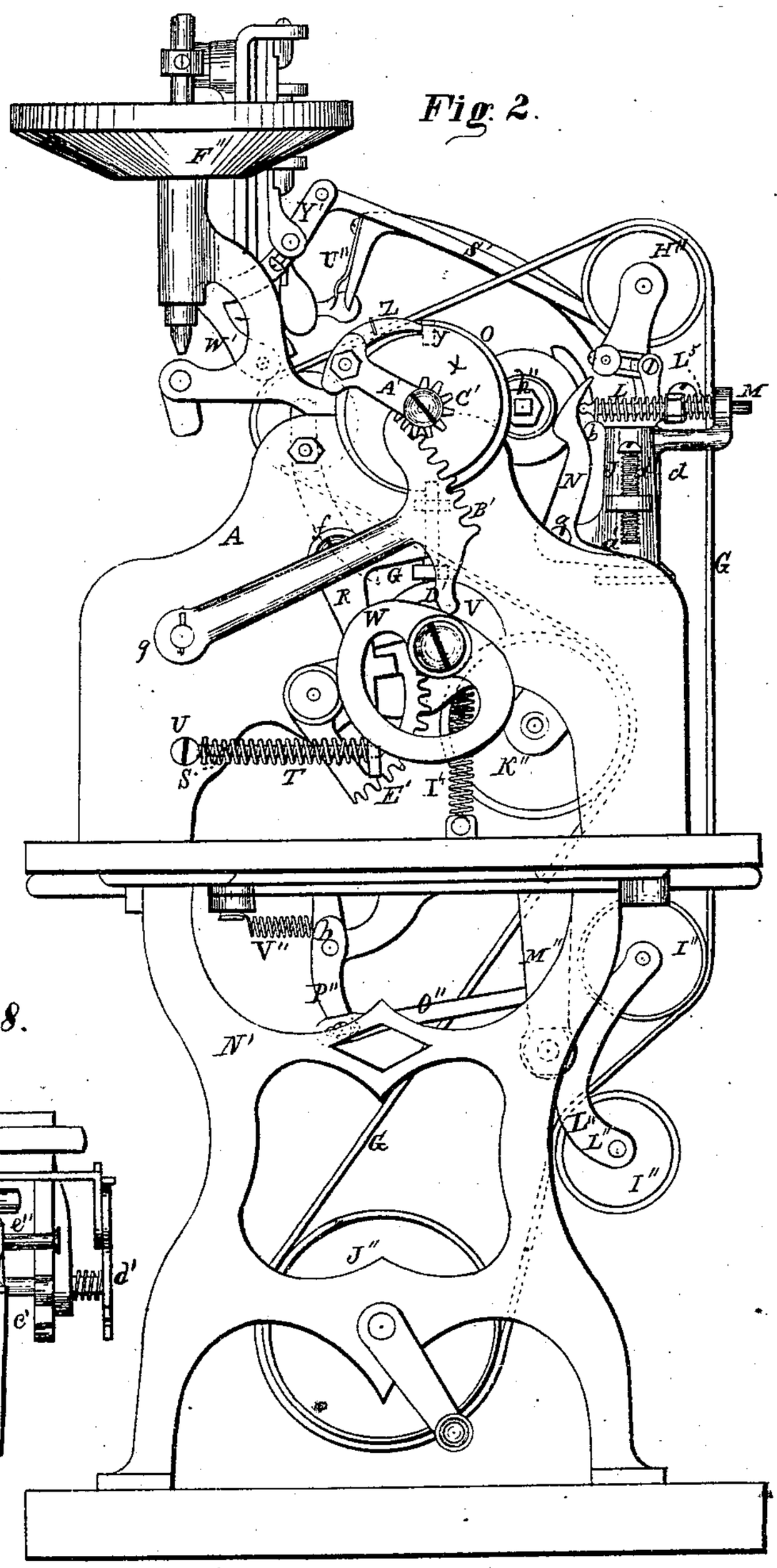
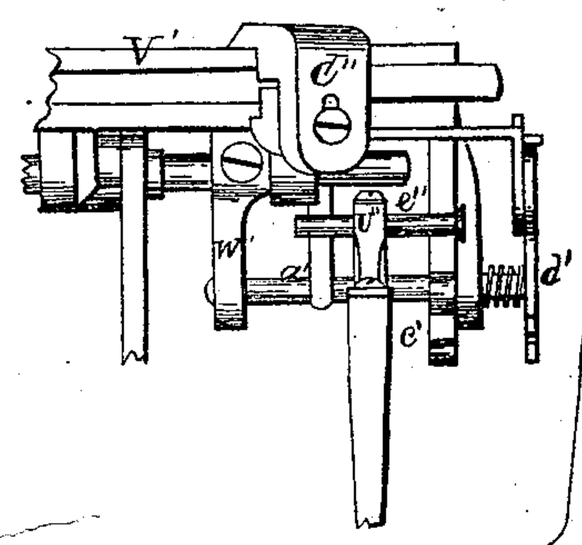



*Fig. 8.*

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THE GRAPHIC CO. PHOTO-LITH. 39 & 41 PARK PLACE, N.Y.

5 Sheets--Sheet 3.

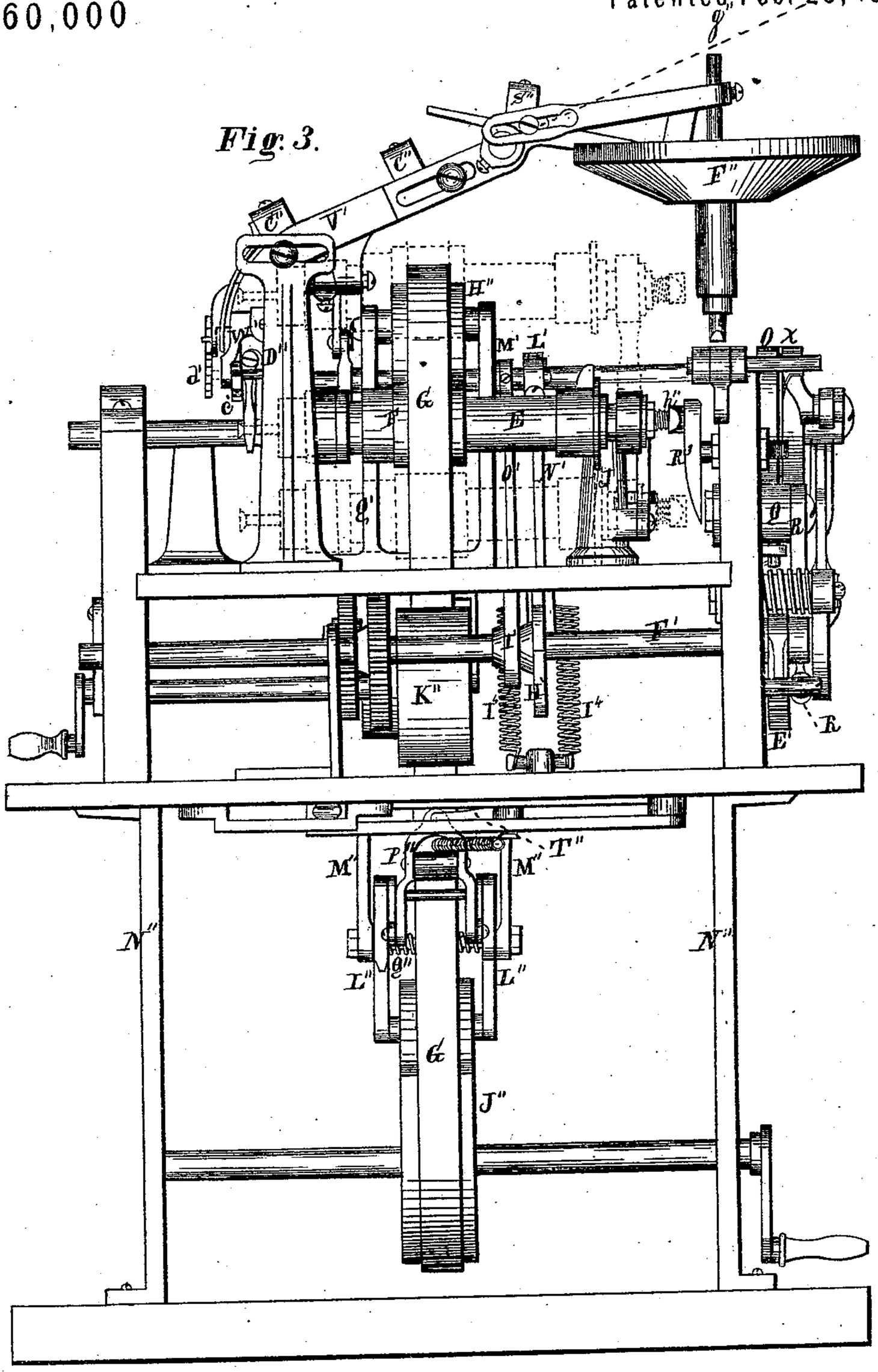
# J. A. BIDWELL & J. N. B. JAQUITH.

## Machine for Shaving, Nicking and Re-shaving Wood-Screw-Blanks.

No. 160,000

Patented Feb. 23, 1875.

*Fig. 3.*

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5 Sheets--Sheet 4.

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## Machine for Shaving, Nicking and Re-shaving Wood-Screw-Blanks.

No. 160,000

Patented Feb. 23, 1875.

*Fig. 4.*

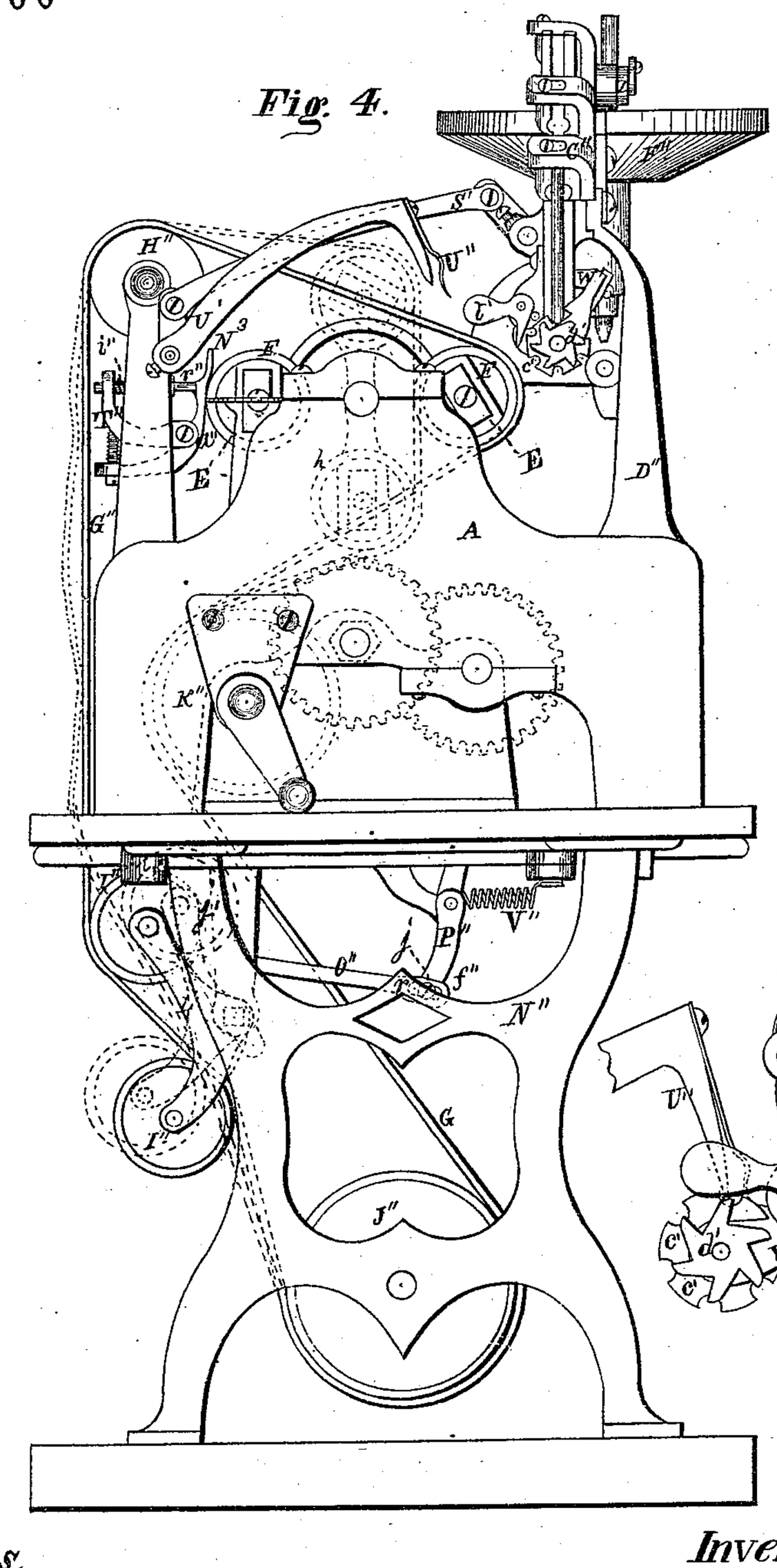
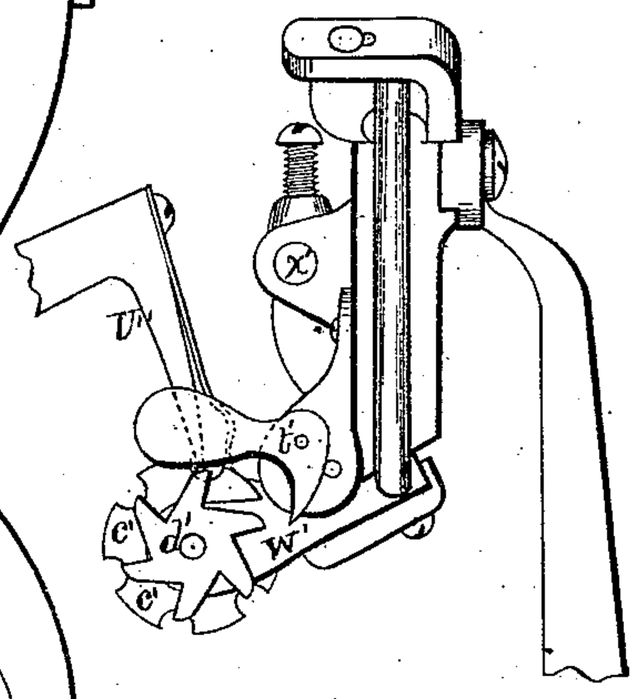



*Fig. 7.*

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5 Sheets--Sheet 5.

# J. A. BIDWELL & J. N. B. JAQUITH.

## Machine for Shaving. Nicking and Re-shaving Wood-Screw-Blanks.

No. 160,000

Patented Feb. 23, 1875.

*Fig. 5.*

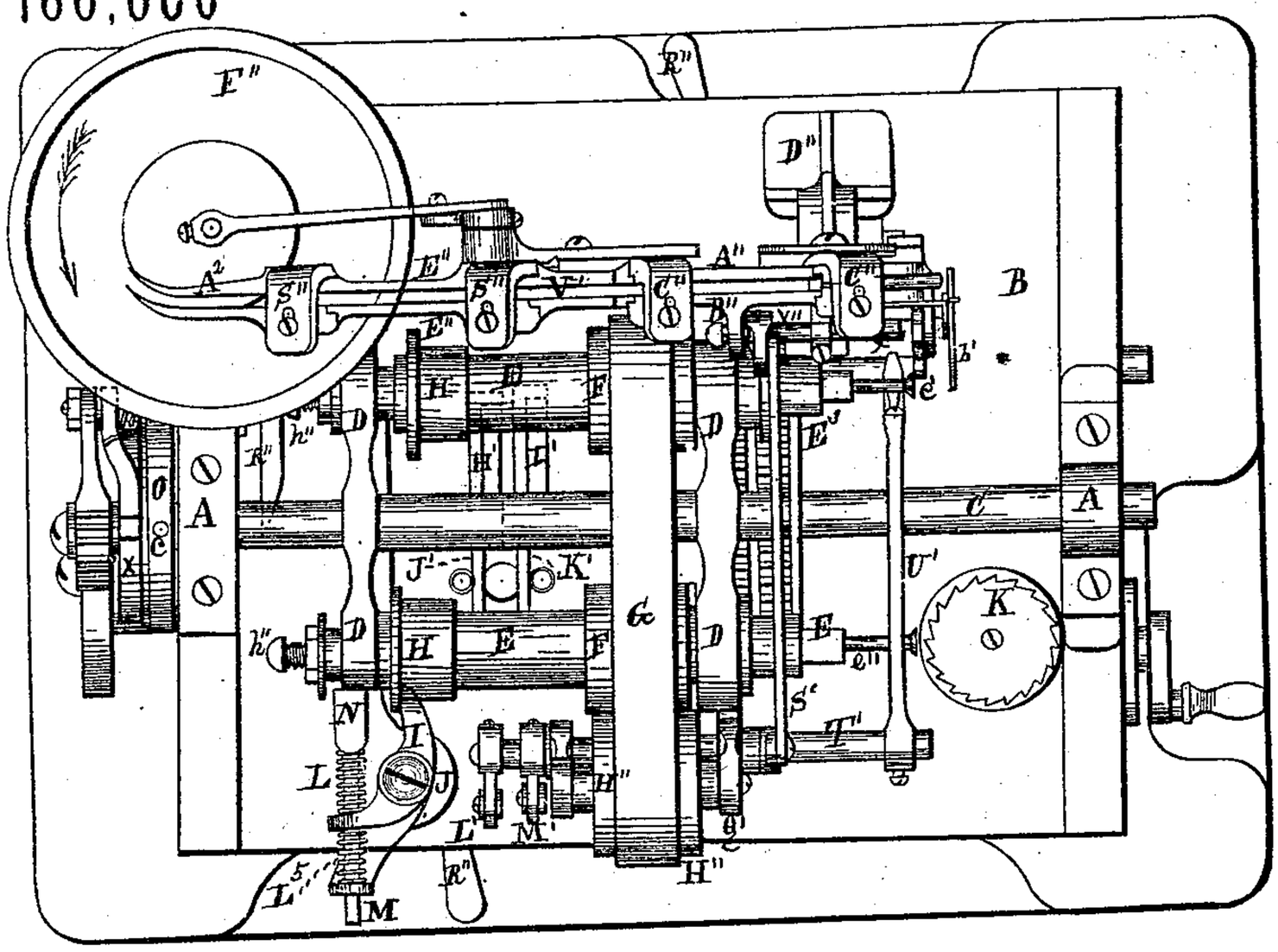
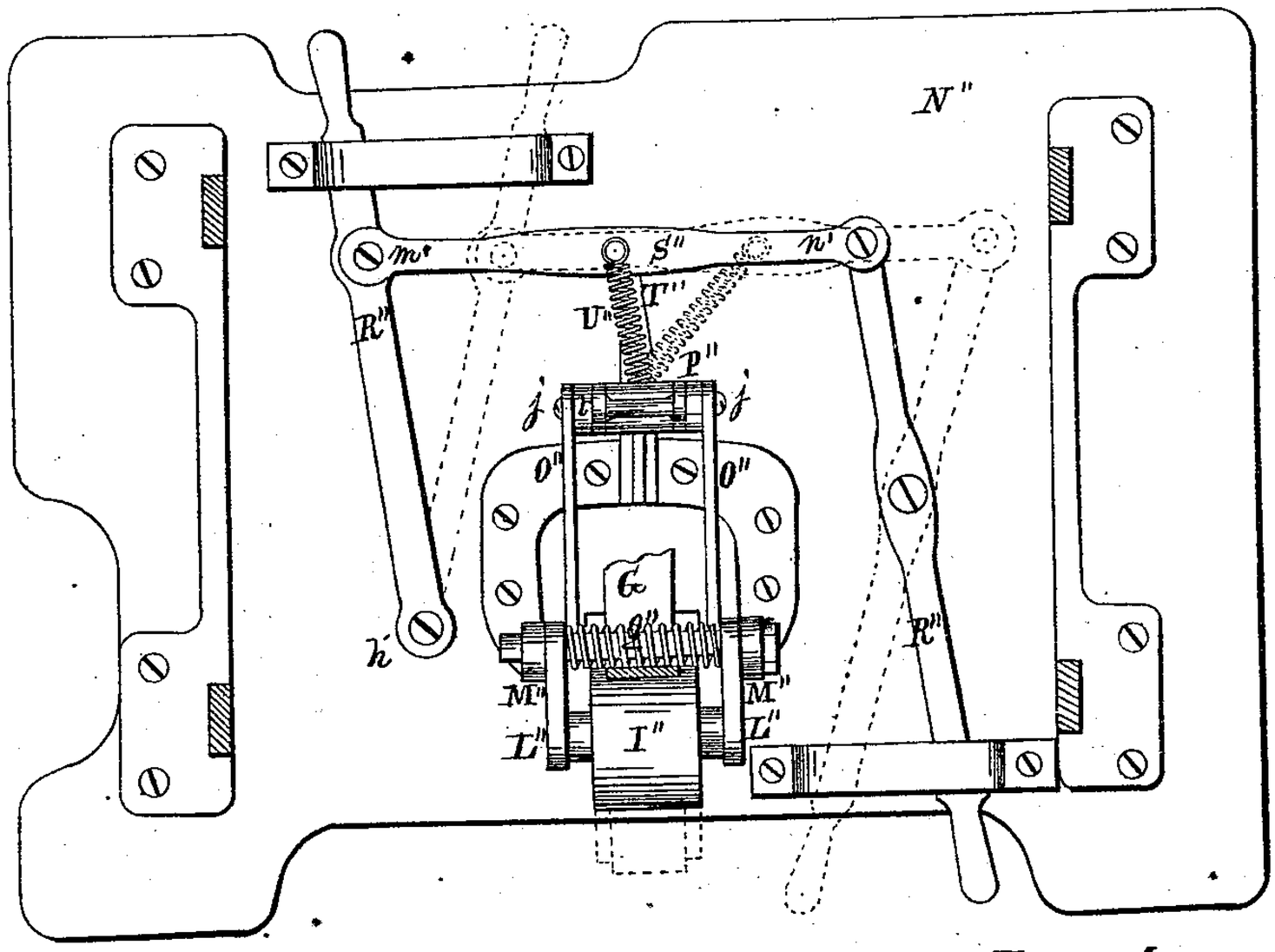



*Fig. 6.*




**Witnesses.**

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# UNITED STATES PATENT OFFICE.

JASON A. BIDWELL AND JEROME N. B. JAQUITH, OF CLEVELAND, OHIO, ASSIGNORS TO THE UNION STEEL-SCREW COMPANY, OF SAME PLACE.

## IMPROVEMENT IN MACHINES FOR SHAVING, NICKING, AND RESHAVING WOOD-SCREW BLANKS.

Specification forming part of Letters Patent No. **160,000**, dated February 23, 1875; application filed November 28, 1874.

*To all whom it may concern:*

Be it known that we, JASON A. BIDWELL and JEROME N. B. JAQUITH, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Machines for Shaving, Nicking, and Reshaving Wood-Screw Blanks; and we do hereby declare that the following is a full, clear, and complete description thereof, reference being had to the accompanying drawings, making a part of the same.

Figures 1 and 3 are front and rear elevations of the machine. Figs. 2 and 4 are end elevations. Fig. 5 is a plan view. Fig. 6 is an under-side view. Figs. 7 and 8 are detached sections.

Like letters of reference refer to like parts in the several views.

The nature of this invention relates to improvements in a machine for shaving, nicking, and reshaving wood-screw blanks; and consists of certain devices whereby the machine is made more certain and perfect in its operation. Of the construction and application of the aforesaid devices to the machine the following is a full and complete description.

Certain parts of the machine are not represented, such parts being omitted as not essential to a full and proper understanding of the improvements applied to it, and which omitted parts are old and in use in various places where wood-screws are made and accessible to the public.

In the standards A A of the frame B is journaled the shaft C of a revolving yoke, consisting of the arms D D, projecting from each side of the shaft. In each pair of arms is fitted so as to revolve freely, and to slide longitudinally therein, a screw holder or clamp, E, on which is secured a pulley or drum, F, whereon runs the belt G for revolving the clamp, for a purpose hereinafter shown. Said screw holders or clamps E E consist each, in part, of a pair of jaws opened and closed by certain appropriate mechanism, consisting of levers, springs, &c., arranged within the body of the mandrel or holder E, and operated from without by a cam or other equivalent device at the proper moment for receiving the screw-blank when presented by the fingers or nippers, and which blank is pushed from the fingers into the jaws of the clamp by a device termed a "pusher," consisting of a rod, which, at the proper time, springs forward and strikes the head of the blank, thereby pushing it through the fingers into the open jaws of the clamp, which then close upon the blank, and hold it so that it is withdrawn from the fingers on their upward movement; all of which devices and mechanism, or slight modifications thereof, are old, and have long been in use. Hence, they form no part of our invention. On each clamp is secured a flange, H, against which the inner end of the lever I (pivoted in the end of the post J, Fig. 5) presses, for retreating the clamps and screw-blanks therein held from the slotting-saw K, Fig. 5. The pressure given to the lever for retreating the clamps is obtained from the spring L on the sliding rod M, which passes through the opposite bifurcated end of the lever, between which and the arm N said spring is placed on the rod, as shown in Fig. 2, in which it will be seen that the resiliency of the spring will push the end of the lever against the side of the flange, thereby retreating the clamp from the saw, as aforesaid. The arm N referred to is in the form of a bell-crank, as will be seen in Fig. 2. Said arm is pivoted at *a* to a projection of the post J, whereon it vibrates. It will be seen that the vertical limb of the arm bears against the end of the yoke or arm thereof when in a horizontal position, whereas the horizontal limb of the arm extends to and under the screw *a'*, as indicated by the dotted lines. The pressure of the arm upon the yoke is obtained from the spring L on the rod M. Said rod engages the arm, and is forced against the yoke by the reaction of the spring exerted upon the collar *b* of the rod.

It will be seen that the office of the spring L is twofold, viz., that of holding the arm upon the yoke, and for forcing back the clamps from the saw. Thus, when, during the revolution of the yoke, the arm thereof impinges upon the arm N, it is thereby forced back, compressing the spring L, which, as a consequence, will force the inner end of the arm I strongly against the flange H, and cause the clamp to slide back, retreating the screw-blank from the

saw. So soon as the yoke leaves the arm N said arm is pushed forward by the reaction of the spring L, and at the same time the inner end of the arm I is pushed back by the reaction of the spring $L^5$ on the outer end of the arm, to make way for the flange on the next clamp that may come round in position to again retreat from the saw immediately that the slotting is done. The purpose of the screw *a'* is to regulate the pressure of the arm on the yoke, which is done by setting down the screw so that the horizontal arm of the lever will touch the end thereof, and thereby prevent the upper end of the lever from pressing upon the yoke, or permit such degree of pressure as may be desired.

The screw-blank is advanced to the saw for nicking by a certain device arranged near that end of the clamp holding the blank, by which, as the clamp comes round in position to the saw, it is pushed toward it far enough for the blank to be nicked. The moment when done, the mandrel or clamp holding the blank is retreated from the saw by the means above described.

The above device for advancing the blank to the saw consists of a cam operating on the body of the mandrel or clamp, the particular construction and operation of which need not here be described, it being old and in use, or such simple modification of the same that may be the suggestion of ordinary skill without invention.

On one end of the yoke-shaft is secured a wheel, O, Figs. 1 and 2, in the periphery whereof are two pin-holes, one of which is shown at *c*, Fig. 5; the other is diametrically opposite. The purpose of said holes will hereinafter be shown. Directly under the wheel is a pin, P, Fig. 1, held loosely in the lugs *d*. Said pin is arranged in such relation to the wheel O that it will slip into the holes *c* when, during the rotation of the wheel, the holes are brought around in proper relation for its admission. The pin is operated by an arm, Q, in the bifurcated end of which it is held, and moved upward and downward by cross-pins *e* inserted in the pin P, and between which the bifurcated end of the arm is held, as shown in Fig. 1. The arm Q is vibrated for actuating the pin P by the arm R, both of which are pivoted at the point *f*, and connected to each other, forming a right-angled lever or bell-crank. Through the lower end of the arm R passes a rod, S, on which is a spring, T, Fig. 2, between the end of the arm and the stud U. The end of the rod rests loosely in the stud, against which the spring reacts, thereby actuating the arms or bell-crank for projecting the pin into the holes in the wheel O referred to. The pin is withdrawn from the holes in the wheel by a cam, V, Fig. 2, connected to the cam W, both of which have a common axial bearing.

The purpose of the cam W is to rotate the yoke above described, and which it does as follows: On the yoke-shaft, by the side of the wheel O, is a wheel, X, Figs. 1 and 2. In the periphery of the wheel is cut a notch or shoulder, Y. Diametrically opposite is made a similar shoulder.

It will be observed that the shoulders of the wheel X and the two holes in the periphery of the wheel O are in the same diameter; hence the shoulder and hole are respectively close together.

Z is a pawl, made to engage the shoulders of the wheel X, as shown in Fig. 2, whereby the two wheels are rotated half a revolution at a time. Said pawl is attached to an arm, A', fitted loosely on the axis of the wheels X O, and is actuated for turning said wheels by a segment-gear, B', the arm whereof is pivoted at *g*. Said segment-gear is made to engage a pinion, C', Fig. 2, forming a part of the arm A' of the pawl. The lower end of the segment B' terminates in a finger, D', which engages the rim of the cam W, and thereby is timely operated for rotating the wheels X O, and, consequently, the yoke. The cam W, in turn, is operated by a segment-gear, E', secured to the outer end of the shaft F', Fig. 3, and made to engage a pinion, G', on the shaft or stud carrying the cams W V. On the shaft F', referred to, are secured two cams, H' $I^1$, Fig. 3, which, respectively, operate the levers J' K', Fig. 5, pivoted in a hanger depending from the under side of the top of the frame A. Said levers are retained upon the face of the cams by the springs $I^4$. To the opposite end of the levers are attached, respectively, the arms L' M' by the links N' O', Figs. 1 and 3. The arm M' is secured to a hollow shaft, P', Fig. 1, having its bearings in the supplementary frame Q'. To the other end of the tubular shaft is secured an arm, R', Fig. 1, which is connected to the feeding device by a link, S', for operating the same, as will hereinafter be shown. The arm L', above referred to, is secured to a shaft, T', Fig. 5, passing through the hollow shaft P', wherein it has its bearings. To the outer end of said shaft T' is secured an arm, U', Fig. 4. A further description of said arm will hereinafter be made.

The feeding device referred to is constructed as follows: From the end of the conductor V' is suspended a cradle, W', Figs. 2, 4, 7, and 8, from a shaft, X', Figs. 1, 7, and 5. Said shaft is vibrated by the link S' in its connection with the arm R' of the hollow shaft referred to, and the arm Y' on the shaft from which the cradle depends. In the lower part of the cradle is a shaft, *a'*, Fig. 8, on which, between the sides of the cradle, is secured a notched wheel, *c'*, Figs. 4 and 5. On the end of the shaft, outside of the cradle, is secured a ratchet-wheel, *d'*, Figs. 3 and 4. The conductor V' referred to consists of two bars, A'' B'', Fig. 5, arranged parallel to and near each other, leaving a space between them, forming a slot. The two bars are connected to each other by adjusting-ties C'', whereby the space between them may be made narrower or wider, according as the thickness of the screws or blanks

for screws may be. The conductor is supported in position by the standard D″, which also supports the cradle depending from the end thereof, as shown in the drawings. To the upper end of the conductor is hinged a fork, $A^2$, consisting of the tines E″ E″, Fig. 5, which are also connected to each other by adjusting-ties S″, whereby the space between them may be narrowed or widened, according to the size of the screw-blanks to be picked up thereby from the hopper F″, into which said blanks are placed, and wherefrom they are taken by the fork and passed to the conductor, down which they slide to the feeding device or cradle. The particular feature of this part of my improvement in respect to the mechanism for lifting the blanks from the hopper and transferring them to the delivering mechanism consists in the provision for their adjustment to adapt the mechanism to various sizes of blanks, as may be required. G is a belt, whereby the screw holders or clamps E E are rotated, for a purpose presently shown. It will be seen that said belt passes over the yoke on the pulleys or drums F; thence over the pulley H″, down to and between the pulleys I″ I″ to the pulley or drum J″; thence around the drum K″ to the yoke. When the yoke is made to change its position from a horizontal to a vertical one, as indicated by the dotted lines *h*, Fig. 4, it will be obvious that the belt must become loose in consequence of such change. In order to take up this slack in the belt is the purpose of the two drums I″ I″, held in the arms of the vibratory frame L″. Said frame is pivoted in the hangers M″, depending from the top of the stand N″, as shown in Fig. 1. To each of the arms of the frame L″ is connected a link, O″, Fig. 6. The opposite ends of the links are connected to a vibratory frame, P″, Figs. 2 and 3, by a slotted connection, as seen at *f*″, Fig. 4, a slot being made in the end of the links for the play of the attachment screw or bolt, whereof the connection is made. Around the pivotal shaft, whereby the frame L″ is attached to the hanger M″, is a spring, Q″, Fig. 6, the resiliency of which tends to throw the upper drum, I″, held in the frame, outwardly, and the lower one inwardly, as the yoke assumes a vertical position, thereby causing the belt to slacken. The slack, however, is immediately taken up by the oblique relation of the drums in respect to each other, caused by the resiliency of the spring Q″ referred to. The lower drum forces the slack of the belt upon the pulley J″, thereby giving it a stronger hold upon it than if the slack were taken up by the upper drum while the lower one remained inactive or without vibratory movement. The slot in the end of the links O″ allows the frame L″ and the drum to vibrate for taking up the slack of the belt while the hanger P″ remains inactive. The purpose of said hanger P″ is to allow the operator to tighten or slacken up the belt by hand, which is done by the levers R″, one on each side of the table of the machine, as seen in Fig. 6. Said levers are pivoted to the top of the table at *h i*, respectively, and each to the sway bar or link S″ at *m*′ and *n*′, respectively. To the middle of the sway-bar is pivoted a rod, T″, Fig. 3, arranged directly above the spring U″, Fig. 6, and parallel therewith; hence not fully seen, the spring being in the way. The inner end of said rod is made to engage the hanger above the axis *b*, Fig. 2, of vibration. The position of the levers R″, as indicated by the dotted lines in Fig. 6, is such as when the slack of the belt can be taken up automatically by the machine, the tightening rollers or drums being free to vibrate to take up the slack of the belt during the operation of the machine, the degree of vibration being controlled by the length of the slot *r*, Fig. 4, in the links O″, whereby they are connected to the vibratory hanger P″. Now, on changing the position of the levers from that indicated by the dotted lines to that shown by the drawing, the lower end of the hanger will be moved outwardly by pushing in the upper end thereof by means of the rod T″ referred to. As the spring and rod move from the oblique position indicated by the dotted lines in Fig. 6 to the direct one, as shown by the line-drawing, the length of the rod pushes in the upper end of the hanger, causing a corresponding outward movement of the lower end, thereby drawing back the upper slack roller I″, at the same time projecting forward the lower end by means of the links O″, the connecting-pins *j*, Fig. 6, of which draw upon the outer end of the slots in the links, and thereby retains the tightening rollers or drums in the position indicated by the dotted lines *j*′ in Fig. 4, in which position the belt remains slack, and as a consequence the machine is thereby stopped working. On pushing the levers again to the position indicated by the dotted lines aforesaid in Fig. 6, the lower end of the hanger P″ moves in, as the upper end is drawn outward by the spring U″, as fast as the pin, in concert therewith, is drawn back by the movement of the sway-bar, thereby allowing the tightening-rollers to vibrate the length of the slots in the links O″, as the belt may continue to tighten or slacken, in consequence of the rotation of the yoke, as aforesaid.

The practical operation of the machine is as follows: The screw-blanks to be operated upon are placed in the hopper F″, which, by appropriate mechanism, (not shown in the drawings,) is made to revolve in direction of the arrow, Fig. 5. As the hopper revolves, the open end of the fork being down in the hopper among the blanks, as shown in Fig. 1, a number of them become caught between the tines. By mechanism, (not shown,) the fork, at certain and regular intervals, is raised up to the position indicated by the dotted line *g*″, Figs. 1 and 3. This elevation of the fork allows the blanks hanging by the heads therein to slide down between the tines thereof into the conductor V′, down which they continue

to slide, suspended by the heads, to the cradle W, on the wheel and arm whereof they drop one at a time, as shown in Fig. 8, in which $e''$ represents the screw-blank.

It will be observed that the head of the blank is next to the wheel $d'$. This particular position of the blank is caused by the curved lower end of the conductor. The relation of the cradle to the conductor at the time that the blank is deposited upon it is such as shown in Fig. 4. This position is attained by the vibratory character of the cradle, which, as above said, is made to vibrate by the cam I′, through the intervention of the lever K, link O, and link S′, respectively connected to the hollow shaft P′ by the arms M′ and R′, and to the arm Y′, on the shaft from which the cradle depends. The blank, on being placed in the cradle, must now be brought forward from under the conductor, to be seized by the fingers U″, Figs. 2 and 4, terminating the arms U′, above referred to. This forward movement of the cradle is caused by its vibration, effected by means above described. The cradle, when thus swung forward by its vibration, is shown in Figs. 7 and 8, in which position the blank is favorable to be seized by the fingers, which, at this opportune moment, are made to descend by the cam H′ actuating the shaft T′, to which the finger-arm is attached, by means of the lever J′, arm L′, and link N′, heretofore described. The moment that the blank has been seized by the fingers, it is lifted from the cradle by the upward movement of the finger-arm, the peculiar shape of the cam H′ being such as to produce this reaction of the arm at this particular time. The position of the arm and fingers thus elevated, and holding the screw-blank, is shown in Fig. 4, and when down, in the act of seizing the blank, is shown in Figs. 7 and 8. As soon as the blank is lifted from the cradle, the cradle immediately recedes under the conductor for another blank. This receding of the cradle is followed by the rotating of the yoke, which, during the movement of the cradle, retained a horizontal position, as shown in Fig. 5.

The rotation made by the yoke is just one-half of a revolution, thereby bringing the clamp E, Fig. 5, of the yoke on the opposite side of the yoke-shaft C—that is to say, the clamp E takes the place of the clamp $E^3$. The next semi-revolution of the yoke places the clamp $E^3$ on the side of E, and again E on the side of $E^3$, and so on interchangeably at each semi-revolution of the yoke.

As soon as the clamp $E^3$ has attained its proper position, as shown in Fig. 5, the arm holding the blank descends by the operation of the cam H′, which, by its peculiar construction, permits the arm to descend so far as to bring the blanks held in the fingers in line with the opening in the clamp $E^3$, which, by a certain mechanism, (not shown,) is griped by the clamps and retained therein. At the same time the arm and fingers are lifted upward by the continued movement of the cam H′, actuating the lever, &c., above described. During the time occupied by the cradle in moving forward and backward, and the picking up therefrom the blank, the clamp $E^3$ rapidly revolves in the yoke by means of the belt G. This rapid turning of the clamp as a consequence turns the blank, the head whereof is now properly dressed off by a shaving-tool arranged in relation thereto, which, however, is not shown.

The aforesaid shaving device consists of an ordinary triangular grooved or V-shaped cutter, whereby both sides of the head are shaved at the same time. The cutter, like those in ordinary use in this class of machines, is held in a movable jaw or standard, which is operated at the proper time to bring the cutter to the head of the blank, for shaving and receding it therefrom after the head is shaved. The construction and operation of the device for actuating the cutter holder or jaw are in no way essentially different from that now in use in other machines, and which is susceptible of various modifications. The same cutter is used for shaving and reshaving. The shaving of the head being done, the yoke makes a half-turn, bringing the shaved head $e''$ to the saw K to be slotted, the position of which in relation thereto is shown in Fig. 5. The blank is drawn against the edge of the saw for slotting by certain mechanism, (not shown,) which draws the spindle or clamp holding the blank forward toward the saw, and per consequence the blank held therein, which is again drawn back to release the saw from the slot by the inner end of the lever I referred to pressing against the side of the flange H on the clamp, which retreats the clamp from the saw at the moment that the head of the blank is slotted, and the hold of the advancing mechanism is released, the force of spring L (which is compressed by the forward movement of the clamp) being sufficient for this purpose. The position of the clamp and blank therein held, when thus slotted and withdrawn from the saw, is shown in Figs. 1 and 5. The slotting being done, the yoke makes another half-turn, thereby bringing the slotted blank to its first place, to the shaving-tool, whereby the burr formed by the saw is dressed off. The clamp now opens, and the slotted blank is forced therefrom by an appropriate contrivance. (Not shown.) At this time the finger-arm descends and presents another blank to the clamp. The arm and fingers at once ascend to the position shown in Figs. 2 and 4. Immediately the cradle moves forward, presenting another blank for the fingers, by which it is presented and pushed in between the jaws, and is directly seized by them. The cradle at once moves back and the arm returns to its first position, holding the blank aloft, to be again carried down to the clamp by the time the previous blank has been shaved, slotted, and the burr of the slot removed. In order to bring the clamp forward again, after it has receded from the saw, by means of the

lever I, so that the burr caused by the saw may be removed, is the purpose of the vertical inclined plane $R^3$, Figs. 1 and 3, against which, as the yoke revolves, the end of the clamp, or the adjusting-screws *h''* thereof, impinge, and is thereby pushed forward, bringing the head of the blank in proper position for the removal of the burr. The adjusting-screws *h''* in the end of the clamp are for the purpose of regulating the distance that the clamp needs to be slid longitudinally to bring the blank in proper position for shaving, slotting, and for taking off the burr. It sometimes happens that a short or an imperfect blank comes down the conductor and lodges on the cradle, which the fingers are unable to pick up, in view of which it is necessary that the defective blank be removed, so that a perfect one may come in position for the fingers. To this end is the object of the ratchet-wheel *d'*, Fig. 4, and pawl *t'*, the operation whereof is as follows: In the notches of the wheel *c'* the headed end of the blank lies when in the cradle, and from which it is picked up by the fingers on being carried out from under the conductor. During this movement of the cradle from under the conductor the wheel *c'* does not turn, but remains steadfast, holding the blank. On the return of the cradle to the conductor the wheel *c'* is turned by means of the ratchet-wheel, which catches the end of the pawl, and is thereby turned around one notch, which will also turn the notched wheel *c'* one notch, and thus carry the notch from under the end of the conductor, its position in relation thereto being taken by the notch next following in order, into which a blank will drop. Now, as the cradle again moves forward, the points of the ratchet-wheel being curved on the edge facing the pawl will allow the end thereof to slip over them from its position shown in Fig. 4 to that shown in Fig. 7. As the cradle again moves back under the conductor the pawl will again engage the ratchet-wheel, thereby turning it and the wheel *c'* around another notch, as before. This will bring the first notch mentioned so far under the wheel that, if a blank had been left therein, it would now fall out by virtue of its own gravity. Hence any blank, perfect or imperfect, that the fingers had in any way failed to pick from the cradle would fall therefrom by this revolving of the wheel *c'*.

It will be obvious that by this means a short or otherwise imperfect blank that the fingers may fail to pick up will not be in the way of another blank descending the conductor, but will be thrown out by the revolution of the wheel *c'*, whereon it partially lies.

The way that the yoke is revolved for the purposes above specified is as follows: The gear-segment E', Fig. 2, referred to, secured to the outer end of the shaft F', (and which shaft also carries the cams for operating the cradle and the finger,) in its revolution, at the proper time, engages the pinion G', Fig. 1, carrying the cams W and V. At the instant that the cam W begins to revolve the cam V also moves, which, in so doing, forces back the arm R, thereby withdrawing the pin P from the hole in the wheel O, thus permitting the wheel to revolve, carrying with it the yoke. The wheel O is caused to revolve by the pawl Z engaging the notch of the wheel X attached thereto, which is actuated for that purpose by the cam W immediately that the pin is withdrawn from the wheel O. As before said, the cams W and V begin to move at the same time. The cam V acts a little in advance of the cam W for the withdrawal of the pin. As the cam W rotates it pushes upward the segment B', thereby actuating the pinion C', causing the pawl connected therewith to carry around the wheels X and O until the hole *c*, Fig. 5, in the upper side of the wheel O comes diametrically under, into which the pin P is immediately projected, thereby holding the yoke in a horizontal position for the purposes above specified. This movement of the cam W, actuating the segment B' and the pawl Z, is such as to cause the wheels to make one half-revolution each time that the cam revolves, thereby inverting the horizontal position of the yoke.

The movement of the two cams is so timed as to rotate the yoke at the proper moment for bringing the clamps holding the shaved blanks over to the saw to be slotted, and for carrying it around, after being slotted, to be freed of the said burr during the time that the cradle is vibrated for presenting the blanks to the fingers, the vibration of the cradle taking place during the respective operations performed upon the blanks.

It is important that the momentum given to the clamps for shaving the head of the blank should be stopped at once on its arrival to the front of the saw, and the clamp be firmly held while the slot is being cut; otherwise the slotting would be imperfectly done, and the saw liable to be broken. To effect this stopping of the clamp is the purpose of the brake $N^3$, Fig. 4, pivoted at *a''* in a stay, T'', against the clamp, or the pulley thereon. It is forced by a spring, *i''*, on the pin *r''* at such time that the revolving clamp comes before the saw by the action of the brake upon the clamp. Its revolution is instantly stopped, and firmly held while the slotting is being done.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The belt-tightener, consisting of the pulleys I'' I'', as arranged in relation to each other in the arms of the vibratory frame L'', and spring Q'', in combination with the belt G, drums J'' and K'', pulley H'', and yoke, consisting of the shaft C, arms D D, and clamps E E, substantially in the manner as described, and for the purpose set forth.

2. The arm I, lever N, rod M, and springs L and $L^5$, as arranged to co-operate, in combination with the flange H of the clamps E of the yoke, consisting of the shaft C and arms

D D, substantially in the manner as described, and for the purpose set forth.

3. The brake $N^3$, spring $i''$, and pin $r''$, arranged to operate, in combination with the clamps E, in the manner as described, and for the purpose set forth.

4. The shaft *a*, notched wheel *c'*, ratchet-wheel *d'*, pawl *t'*, and vibrating cradle W, in combination with the stationary conductor V', substantially as described, and for the purpose specified.

5. The improved fork $A^2$, consisting of bars E'' E'' and adjusting-ties S'', so arranged that said bars may be adapted to different sizes of screw-blanks, in combination with the adjustable conductor V' and revolving hopper F'', substantially as and for the purpose set forth.

6. The segment-gear E, cam V, lever R, spring T, and rod S', in combination with the pin P for operating the same, in the manner as described, and for the purpose specified.

7. The cam W and segment-gear B', in combination with the pinion C', pawl Z, wheels X O, and yoke, consisting of the shaft C, arms D D, and spindles or clamps E E, substantially in the manner as described, and for the purpose set forth.

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