3 Sheets—Sheet 1.

W. E. WARD.

Machine for Dressing the Heads and Pointing and Threading the Shanks of Bolts.

No. 218,841. **Patented Aug. 26, 1879.**

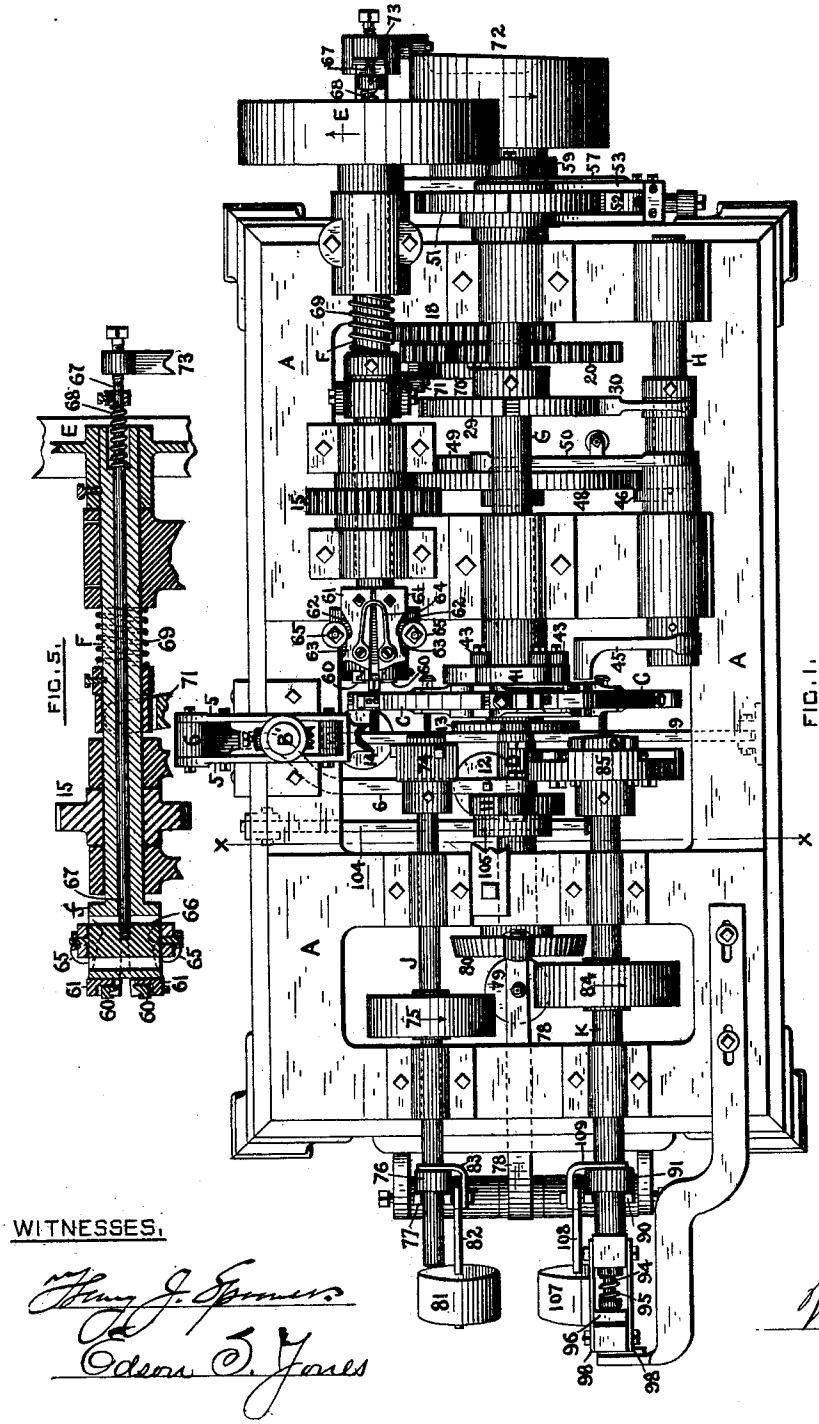


FIG. 1.

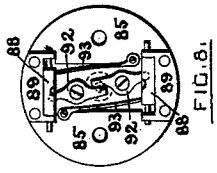


FIG. 8.

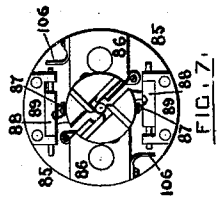


FIG. 7.

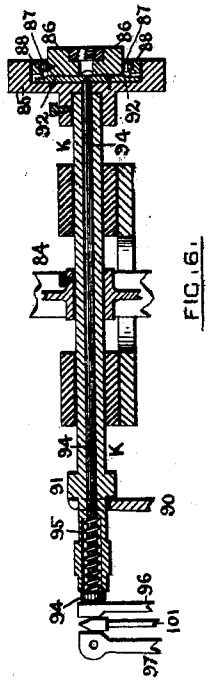


FIG. 6.

FIG. 5.

WITNESSES.

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3 Sheets—Sheet 2.

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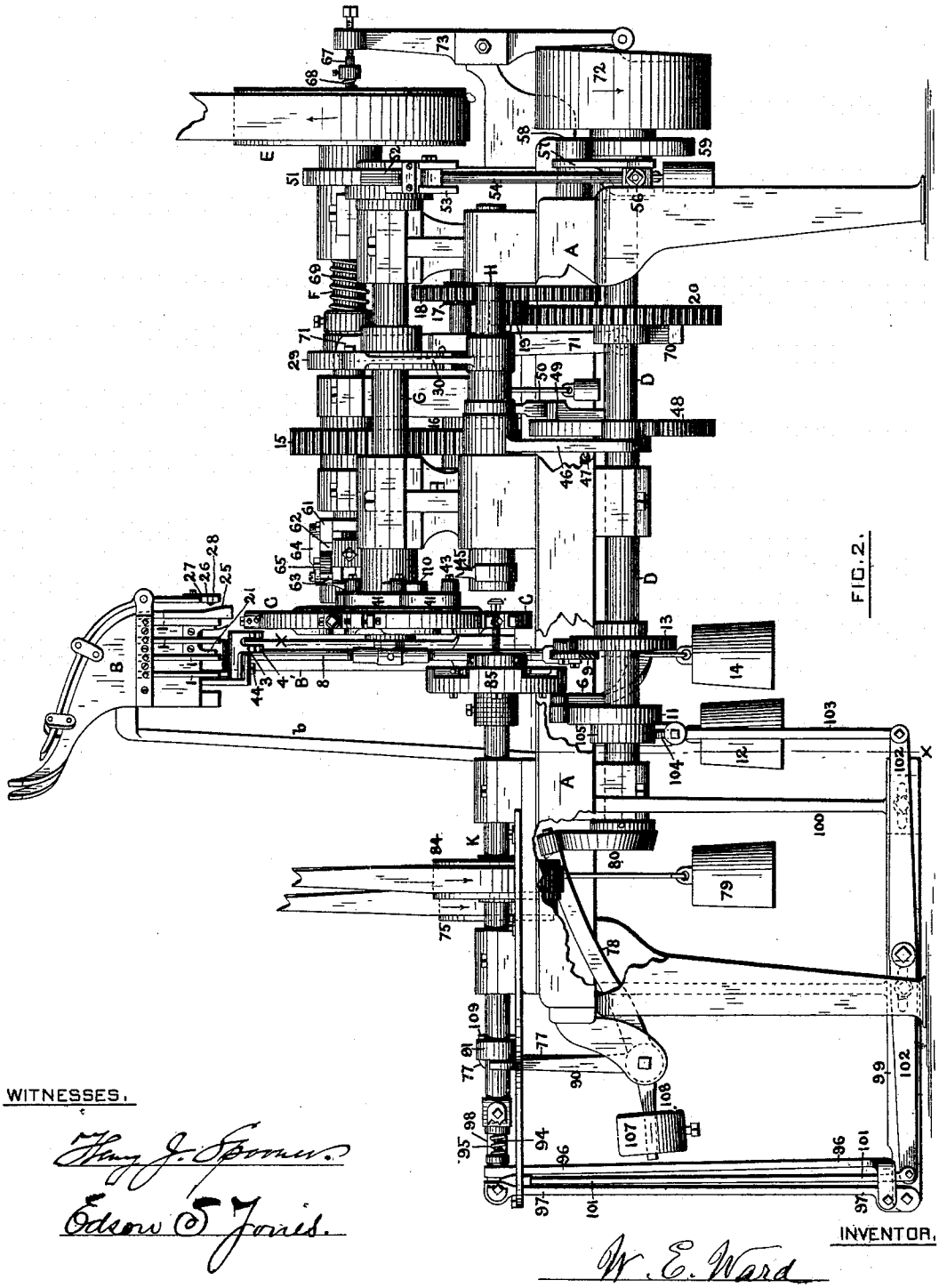


FIG. 2.

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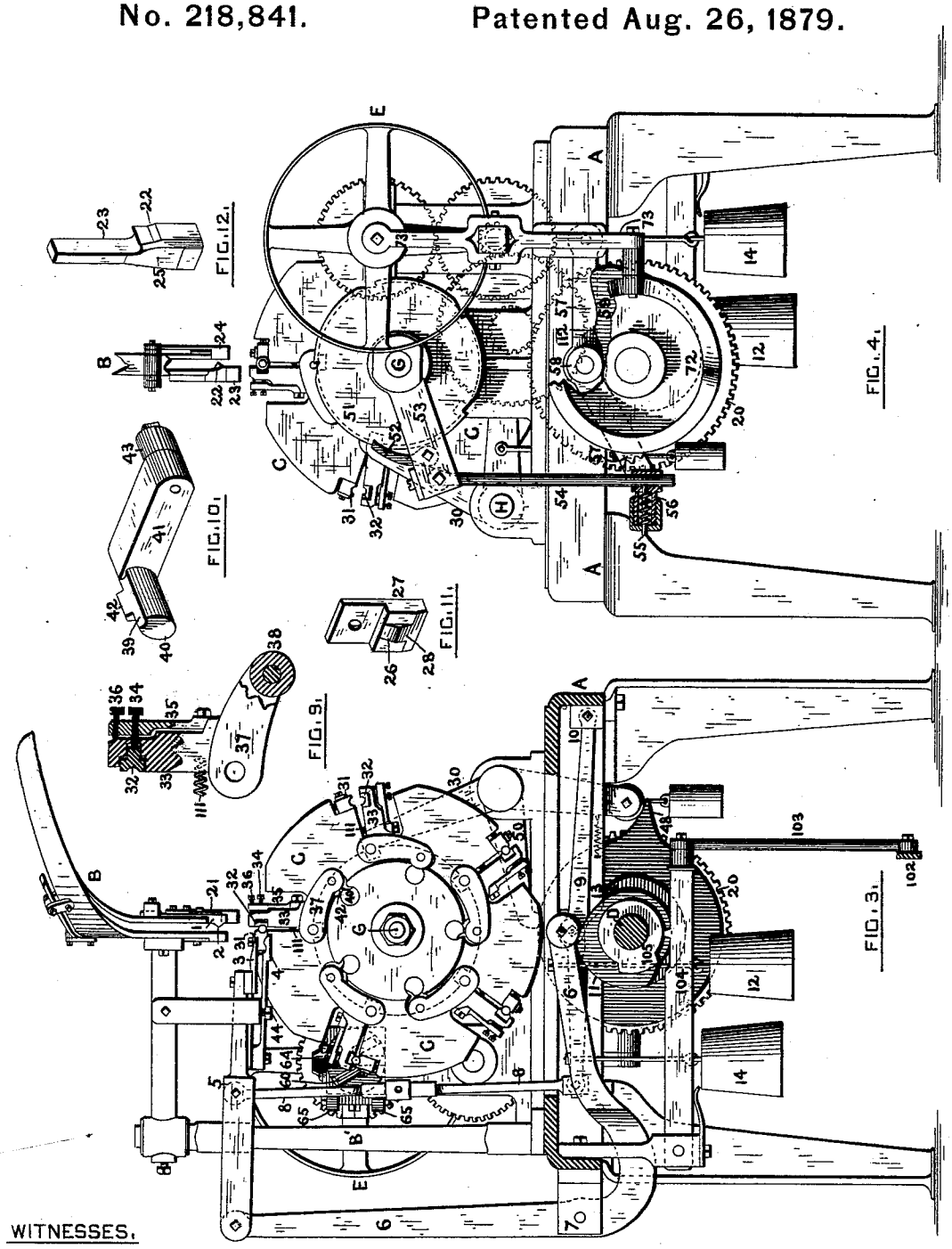
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3 Sheets—Sheet 3.

W. E. WARD.

Machine for Dressing the Heads and Pointing and Threading the Shanks of Bolts.

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WITNESSES.

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UNITED STATES PATENT OFFICE.

WILLIAM E. WARD, OF PORT CHESTER, NEW YORK.

IMPROVEMENT IN MACHINES FOR DRESSING THE HEADS AND POINTING AND THREADING THE SHANKS OF BOLTS.

Specification forming part of Letters Patent No. **218,841**, dated August 26, 1879; application filed October 31, 1878.

To all whom it may concern:

Be it known that I, WILLIAM E. WARD, of Port Chester, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Machines for Dressing the Heads and Pointing and Threading the Shanks of Bolts; and I do hereby declare that the following specification, taken in connection with the accompanying drawings, forming a part of the same, is a full, clear, and exact description thereof.

My invention relates to the machinery necessary to turn out a finished bolt from a common forged blank appropriate for the same, and comprehends devices and combinations for performing the operations of selecting the blanks one at a time from a row or stack, presenting such blanks one after another in succession to an intermittingly-revolving multiple blank-holder, the plane of revolution of which is perpendicular to the axes produced of the head-dressing, pointing, and threading tools, respectively, subjecting each blank to the action of the head-dressing tool, the pointing-tool, and the threading-tool by consecutive operations, performing these several operations of head-dressing, pointing, and threading simultaneously upon different blanks, and finally discharging the finished bolts one after another from the machine.

The characteristic feature of the machine is the employment of an intermittingly-revolving multiple blank-holder, and the location of the tool for dressing the heads of the blanks, and the tools for pointing and threading the shanks upon opposite sides thereof, the axes of the said several tools, when produced, being parallel with each other, and all intersected by the plane in which the blank-holder revolves.

In organizing the machine upon this method various improvements are involved, some of which relate to novel features of construction, and others to improvements in combinations and arrangements, all of which will be particularly specified hereinafter.

Referring to the three sheets of drawings, Figure 1 represents a plan of my improved machine, the ways or guides for conveying the blanks being removed. Fig. 2 shows a side elevation of the machine. Fig. 3 represents an end view of a portion of the same, a vertical transverse section being taken on line *x x* of Fig. 1. Fig. 4 shows a portion of the machine in end elevation; and Figs. 5, 6, 7, 8, 9, 10, 11, and 12 represent details of construction.

It is to be understood that any suitable mechanism may be employed for selecting the blanks from a mass and depositing them in a row in the conveyer ways or guide, from which they are to be taken one by one and presented for operations to be performed on them to the machine.

I will first describe the mechanism by which the blanks are maintained in proper position for delivery and conveyed to the holder, which presents them successively to the tools which operate on different portions of the blanks.

As shown in Figs. 1, 2, 3, and 4, A represents the rectangular frame of the machine, upon which the various working-parts are mounted. B is the conveyer-guide, supported upon the frame by the rods B′ and *b*, and arranged centrally above the multiple blank-holder C.

When the bolt-blanks have filled the conveyer, they form a stack, which is supported by two or more spring-checks, as at 1, each independent of the other and secured to the side of the conveyer, as shown at Figs. 2 and 3. These checks exert a pressure upon different sections of the blank, and each is furnished with an inwardly-projecting offset, 2, whose upper surface is an inclined plane, upon which the lowest bolt in the stack rests, the said bolt being sustained at the side by the rear face of the conveyer, which is made comb shape, to allow of the entrance of feeding-fingers to seize the blank and present it to the blank-holder C.

The mechanism employed for conveying the blanks from the guide B to the multiple holder C is what may be termed a "four-motion feed," into the operation of which the following parts enter. The feeding-fingers are composed of an upper rigid member, 3, and a lower spring member, 4, as shown at Fig. 3, the said fingers being mounted upon an arm, 5, whose rear portion is forked and connected with a bell-crank lever, 6, having its fulcrum at 7 on the

side of the frame A. The central portion of the arm 5 is supported by an adjustable rod, 8, to which it is connected, the said rod being pivoted to the end of a lever, 9, which has its fulcrum at 10 on the side of the frame. The free end of the bell-crank lever 6 rides upon a cam, 11, placed upon the cam-shaft D of the machine, and is held in contact therewith by a weight or spring, 12, while the lever 9 engages a cam, 13, by force of a weight or spring, 14.

The cam-shaft D is driven from the main pulley E on the shaft F by a train of gears, 15, 16, 17, 18, 19, and 20, the former being splined to the shaft F, and the latter attached to the shaft D, all as particularly shown in Fig. 2.

The forward motion of the feeding-fingers from their upper rearward position (to seize the lowermost blank of the stack) is produced by the action of the weight 12 upon the bell-crank lever 6, the contour of the cam 11 allowing such action. During the seizing of the blank, however, a thrust is produced by the fingers, from which the spring-checks 1 must be relieved, in order that the blank may be properly seated in said fingers. For this purpose the face of the conveyer B may be downwardly extended in the shape of a comb, or it may be supplied with rigid arms, as at 21, whose inner faces are in line with the inside of the conveyer.

The blank having been seized by the fingers, the next motion in order is the stripping of the blank from the conveyer, which operation is performed by the action of the weight 14 upon the lever 9, the contour of the cam 13 allowing such action, which, through the rod 8, gradually depresses the fingers and carries the blank downward over the V-shaped teeth of the yielding spring-checks 1, the rigid finger 3 taking the strain, and the checks returning immediately after the diametrical axis of the blank has passed the apex of the V to their former position, to support the remainder of the stack.

In place of a series of spring-checks, as described, it would be practicable to make use of a single spring-check of sufficient width to give support to the column of blanks; but the construction shown is preferable, for the reason that a series of spring-checks, independent of each other, exert pressure upon different sections of the blank, which is next to be seized by the feeding-fingers, and thereby hold the blank (which may have different widths of cross-section) more firmly and steadily, so that the feeding-fingers can better seize it.

It is desirable that two sides of that portion of the shanks of the blanks under the heads which have been squared before coming to this machine shall occupy vertical planes when delivered to the revolving blank-holder C, and as such squared portions may assume various positions in the guide B the major portion of the blanks require to be more or less axially turned in the fingers, that they may be presented to the jaws of the blank-holder, as above described. This is accomplished during the passage of the blank over and below the offsets of the yielding spring-checks 1 by an inclined plane, 22, on the inner face of a block, 23, Figs. 4 and 12, acting in connection with a spring, 24, Fig. 4, to engage the edges of the squared portion, if it is not in proper vertical position, and axially turn the blank.

It is also necessary that the distance between the under side of the head of each blank and the rear face of the blank-holder C, to which the blanks are to be delivered, should be fixed, in order that the head-dressing tool may properly operate on the heads of the blanks. This is effected during the passage of the blanks out of the conveyer B by an inclined plane, 25, on the block 23, Figs. 2 and 12, and an inclined plane, 26, on a plate, 27, Figs. 2 and 11, secured to the cap-plate of the conveyer. The latter plane, 26, acts upon the heads of such blanks as are in contact with or near said cap-plate, and tends to crowd them inward and cause the under sides of their flanged heads to engage with the plane 25. This plane 25 acts upon the under side of the head of each blank, and tends to slide the blank longitudinally outward as it descends, and another inclined plane, 28, on the plate 27, parallel to the plane 25, also acting during the descent to keep the head in engagement with plane 25. Thus, the said planes acting in combination exactly determine and fix the position of the blank lengthwise with respect to the plane of the face of the revolving blank-holder.

As above described, the forward and downward motions of the delivery-fingers are, respectively, produced by the weights 12 and 14, a feature which is of importance when it is considered that blanks of improper size or shape may gain admittance to the conveyer-guide B. Should such be the case, the fingers might not be able to properly seize the blank and remove it from the conveyer, which would occasion damage to the working parts of the machine if said movements of the fingers were produced by the positive motion of a cam. It will readily be seen, therefore, that, should any obstruction of this character arise, the motion of the fingers would be suspended until the obstruction was removed, and no damaged would be caused to the machine.

After the blank has been delivered to the multiple holder C and griped therein, as will hereinafter be described, the fingers are withdrawn from said blank by the action of the cam 11 upon the bell-crank lever 6, and they are moved upward and their rectangular path of motion completed by the action of the cam 13 upon the lever 9 and rod 8, the said fingers assuming the position from which they were first moved, as hereinbefore described.

I will next describe those portions of my invention which relate to the construction and motions of the intermittingly-revolving multi-

ple blank-holder C, and to the devices employed for griping the blanks therein.

The multiple blank-holder consists of a disk, C, mounted on a shaft, G, and which, when not revolving, and therefore in position to receive the blanks, is locked in such position by the engagement of a notched disk, 29, upon the shaft G, with a detent, 30, sleeved upon a shaft, H. This holder is supplied in this instance with five pairs of radial griping-jaws, as shown at Fig. 3, the said jaws being adjustably mounted to hold blanks of various sizes. One of the jaws, 31, is secured to the disk, while its fellow, 32, is mounted in an arm, 33, of a bell-crank lever, Figs. 3 and 9, which is pivoted to the disk C, the said jaw being retained in place by the engagement of a stud upon its back with a screw, 34, by which it can be adjusted, the said screw taking bearing in a spring, 35, secured to the arm, and the force of said spring being regulated by a set-screw, 36, bearing against the arm 33. This spring is of sufficient power to cause the jaws to securely gripe the blanks when the said jaws are brought into action, and also allows the said jaws to accommodate themselves to any inequalities of the blanks. The other arm, 37, of the bell-crank lever is forked, and carries a roller, 38, Fig. 9, which, when the jaws are open, rests in a groove, 39, in the cylindrical portion 40 of a locking-arm, 41, which has a bearing in the disk C, the said cylindrical portion 40 also being furnished with a cam-tooth, 42. The arm 41 has a position in the rear of the disk, and carries a roller, 43, upon its outer end, as shown in Figs. 1, 2, and 10.

Each blank is delivered to the griping-jaws, with its axis at right angles to the plane of the disk C, by a downward movement of the feeding-fingers in a line radial, or nearly so, to the axis of the blank-holder, the said jaws at this time standing open ready to receive the blank. By this combination and arrangement of the blank-holder relatively to the feeding device no endwise movement is required to be given to the blank for placing it in the jaws; but its head and point are, respectively, in the same vertical planes which they occupied when the blank was in the conveyer-guide, after adjustment therein, as above described, and before being seized by the transferring-fingers. The jaws are closed so soon as the feeding-fingers bring the axis of the blank into coincidence with that of the jaws, the line of coincidence being secured by a set-screw, 44, upon which the arm 5, carrying the fingers, takes bearing when the said fingers are in their lowest position, as shown in Figs. 2 and 3.

The closing of the griping-jaws is accomplished by the following mechanism: To the shaft H is secured a wiper-arm, 45, and a lever, 46, a spring, 47, retaining the latter in engagement with a tooth-cam, 48, upon the shaft D. The revolution of this cam produces, through the lever 46, a partial rotary motion of the wiper-arm 45, bringing it into engagement with the roller 43 on the crank-arm 41, and moving said arm downward, thereby causing the cam-tooth 42 to engage the roller 38 on the bell-crank-lever arm 37, and raise said arm, which moves the jaw 32 inward to its gripe upon the blank and locks it in position. The feeding-fingers are then withdrawn, and the blank-holder is in readiness to be partially revolved to carry the blank to the head-dressing mechanism.

The blank being griped in the jaws, the holder C is next revolved through an arc of seventy-two degrees to bring the longitudinal axis of the blank into coincidence with that of the head-dressing mechanism. The revolution of said holder is accomplished as follows: Being in a locked position, it is first necessary to raise the detent 30 out of the notch which it occupies in the disk 29. For this purpose the toothed cam 48 is supplied with a side cam, 49, Figs. 1 and 2, which, when the blank is griped and the feeding-fingers sufficiently withdrawn, operates upon a lever, 50, secured to the sleeve upon which the detent is placed, and raises said detent. Secured to the shaft G is a ratchet-disk, 51, which is engaged by a pawl, 52, pivoted to a radial arm, 53. From this arm depends a rod, 54, furnished with a notch, with which a spring-pin, 55, engages, the said pin having its bearings in a sleeve, 56, upon said rod. Connected with the sleeve 56 is a lever, 57, which is pivoted to the frame A, and bears a roller, 58, which rides upon a cam, 59, placed upon the shaft D, as shown in Figs. 1, 2, and 4. When the detent is removed from its notch the said cam operates upon the lever 57, and through the rod 54 and pawl 52 partially rotates the blank-holder C, and carries the blank contained therein to the head-dressing tool, the detent falling into a notch in the disk 29, and securely locking the holder in its new position. Should any obstruction prevent the revolution of the carrier the spring-pin will be forced out of the notch which it occupies, the sleeve will slide upon the rod, and the machine will not be damaged.

From the foregoing description it will be readily understood that each pair of jaws is consecutively supplied with blanks by the feeding-fingers, such supply being effected just before a partial revolution of the blank-holder, and that the movement of said feeding-fingers to supply the blanks and the partial revolution of the holder C to consecutively bring said blanks into proper relation with the dressing devices are intermittent, the said movements taking place regularly and at stated times, which times are governed by the completion of the work of the said dressing devices upon the blanks under operation.

Another division of my invention relates to the dressing of the blanks, and includes the operations of and mechanism for shaving the heads, pointing the ends, and threading the shanks, and also mechanism for causing the discharge of the finished bolts from the blank-holder, as will hereinafter appear.

As shown in Figs. 1, 2, and 5, the mechanism for dressing the heads of the blanks consists of suitable cutting-tools 60, mounted in a pair of jaws, 61, which are forked and hinged to a head, *f*, upon the shaft F. The outer side of each fork is recessed, as at 62, is furnished with an inclined plane, 63, and is in engagement, by the force of springs 64, with a roller, 65, the said rollers being mounted on a yoke, 66, which is arranged to slide in the head *f*. This yoke is mounted on a spindle, 67, which passes longitudinally through the axis of the shaft F, projects beyond the end of said shaft, and is furnished with a spring, 68. When this spring is allowed to act it removes the yoke and its rollers to, and retains them in, their rearward position, the said rollers then occupying the recesses 62 in the jaws, and the said jaws being opened by the springs 64.

When the blank is in position to have its head operated upon, the head-dressing tools are advanced by the action of a spring, 69, which engages a collar on the shaft F and moves the said shaft longitudinally toward the blank-holder, the said movement being allowed by the contour of a face-cam, 70, upon the gear 20, which is secured to the cam-shaft D. This cam 70 operates in opposition to the spring 69, and its office is to cause the retreat of the jaw 61 after the head-dressing tools have finished their work and the said jaws have been opened, which it does by engagement with a forked lever, 71, hinged to the shaft F and pivoted to the frame A.

The head-dressing tools having been advanced by the action of the spring 69, as above described, the jaws are gradually closed and the said tools kept to their work by the inclined face of a cam, 72, on the shaft D, Figs. 1, 2, and 4, which cam engages a lever, 73, pivoted to the frame of the machine. This lever 73 is furnished at its upper end with a set-screw, which bears upon the end of the spindle 67, so that, as the cam revolves, the rollers 65 on the yoke 66 are moved out of the recesses 62 and over the inclined planes 63, thereby gradually closing the said jaws and causing the tools 60 to dress the head.

It will be seen that the set-screw in lever 73, by being advanced or withdrawn, varies the operation of the yoke, and causes the tools to approach more or less closely to each other, according to the size of head desired; and that, also, if tapered headed bolts are desired, one set of tools may be made to cut at angles which will vary with each size of head.

When this operation is completed the cam 72 allows the spring 68 to act, which causes the retreat of the rollers 65 into the recesses 62, and the jaws are opened by the springs 64. The cam 70 then acts upon the lever 71 and moves the shaving devices rearward out of the plane of revolution of the blank-head. In the meantime a fresh blank has been supplied to the blank-holder C, which now revolves through an arc of seventy-two degrees, and brings the axis of the blank whose head has been dressed into coincidence with the axis of the pointing-tool, the freshly-supplied blank passing into alignment with the head-dressing tool.

As shown at Fig. 1, the pointing-tool is mounted in a head, 74, secured to a shaft, J, which is continuously revolved by a pulley, 75. A collar, 76, on this shaft is engaged by a forked arm, 77, the said arm being pinned to a shaft, to which is also secured a lever, 78, which is made to bear, by a weight, 79, upon a cam, 80, upon the shaft D. When the axis of the blank has been brought into alignment with that of the pointer-shaft, the blank-holder having been locked in its new position by the detent 30, the pointing-tool is advanced by the weight 79 and forked arm 77, the cam 80 allowing such action.

When the end of the blank has been sufficiently dressed the cam 80 raises the end of the lever 78, and consequently the weight 79, to allow the said tool to retreat. The backward movement of this tool, however, is independent of its forward motion, and is produced by the action of a weight, 81, secured to a sleeved bell-crank lever, 82, Fig. 1, the said lever carrying a forked arm, 83, which engages with the collar 76 on the shaft J. The pointing-tool is thus retreated as fast as the cam 80 will allow.

During the pointing of the first blank the head of the second is being dressed, and a third blank is supplied to the holder C, which now revolves another seventy-two degrees, and carries the first blank into axial alignment with the threading-dies and the second to the pointing-tool, and the new blank to the head-dressing tools. The first blank is therefore in position to have its pointed shank threaded, which is accomplished in the following manner:

Upon a shaft, K, which is continuously driven by a pulley, 84, is placed a head, 85, Figs. 1, 2, and 6, the said head carrying the dies or threading-tools, which are mounted in radial jaws 86, pivoted to the said head, as shown at Fig. 7. The said dies are therefore halved, and are separable for the purpose of disengagement with the threaded shank and avoiding reverse motion.

When the blank is presented to the threading-dies they are in a closed condition, ready to perform their office, the said closed condition being maintained by an adjustable screw, 87, in each jaw 86, the head of each screw bearing upon the surface of a block, 88, which is arranged to slide in a holder, 89, for a purpose hereinafter to appear. The dies being locked in a closed position by the blocks 88, they are in readiness to advance upon the pointed blank, the said advancement being produced by the action of the weight 79 upon the lever 78, to whose shaft is secured a forked arm, 90, which engages a collar, 91, on the shaft K. The forward movement of the dies is therefore simultaneous with that of the pointing-tool, being produced by the same

weight. The dies are therefore brought into engagement with the end of the blank by a yielding pressure; but so soon as they commence their cut and take the bite of the thread they continue to advance without any action of the weight 79 for the purpose.

The dies having cut the required length of thread, they are ready to be opened and be retreated, which actions are accomplished in the following manner:

As shown at Fig 8, the blocks 88 are engaged by levers 92, pivoted at their centers to the head 85, and each block is supplied with a spring, 93, which acts to keep it in the position shown in said figure, and also to hold the inner ends of the levers in contact. Occupying the longitudinal axis of the shaft K is a rod, 94, Figs. 1, 2, and 6, having a conical end, whose point occupies a position immediately in the rear of the inner ends of the levers 92. The outer end of this rod projects beyond the shaft K, and is headed and furnished with a spring, 95, which tends to keep it in a rearward position, and in contact with a vertical arm, 96. This arm is hinged at its foot to another vertical arm, 97, whose upper end is connected, by links 98, to the end of the shaft K, and whose lower end is pivoted to a horizontal bar, 99, attached to the frame of the machine by depending rods 100. The heads of the arms 96 and 97 have inclined planes on their inner faces, the said planes forming an angle, which is occupied, when the dies are closed, by the wedge-shaped head of a vertical rod, 101, Fig. 2. This rod is hinged at its foot to a horizontal lever, 102, pivoted to the bar 99, the other end of said lever being connected to a vertical rod, 103, whose upper end is pivoted to a toothed lever, 104, which, by force of a spring, is kept in contact with a cam, 105, on the shaft D, as shown in Fig. 3.

When the shaft K, which carries the dies, moves forward by the action of the weight 79, and the lead of the thread being cut upon the blank, the upper ends of the arms 96 and 97 and the wedge-shaped head of the rod 101 also move with it, owing to the link-connection between the shaft K and arm 97.

At the time when the required length of thread has been cut the cam 105 acts upon the lever 104, depresses its end, and forces the wedge-shaped head on the rod 101 between the heads of the arms 96 and 97, as shown at Fig. 6. This causes a longitudinal advancement of the rod 94, whose conical end separates the levers 92, and thereby moves the sliding blocks 88 to engage the arms 106 on the radial jaws 86. This action separates the dies, the heads of the screws 87 passing into cavities in the blocks, and disengages them from the threaded screw. They are then immediately moved backward by a weight, 107, which acts through a bell-crank lever, 108, and a forked arm, 109, upon the collar 91 on the shaft K.

When the dies reach their rearward position the cam 105 allows the spring to act upon the lever 104, to withdraw the wedge-shaped head of the rod 101. During this operation the spring 95 returns the rod 94 to its rearward position, and the springs 93 move the blocks 88, thereby closing and locking the dies, which are now in condition to perform their functions upon the succeeding blank.

It now only remains to discharge the finished bolt from the holder C, which is accomplished during the movement of said holder through another arc of seventy-two degrees by the engagement of a stationary cam, 110, Fig. 2, with the locking-arm 41. This cam returns the said arm to its original position, thereby allowing a spring, 111, Figs. 3 and 9, to open the jaws and release the bolt, which falls from the jaws by its own gravity. To insure the discharge of the bolt, however, the cam 59, which is the prime mover of the blank-holder C, is furnished with an irregular face, as at 112, Fig. 4, which acts at the time the griping-jaws are opened to cause an irregular movement of the said holder, thereby securing the discharge of the finished bolt.

I am aware that spring-checks have heretofore been employed in connection with conveyer-guides, and that revolving multiple blank-holders have also been used in machines capable of performing operations on both ends of a blank in the making of a bolt or a screw, and also that devices of various kinds have been employed for taking the blanks from the conveyer-guides and delivering them to the holders.

I am also aware that in screw and bolt making machinery, as heretofore constructed, feeding-fingers have been employed; but I know of no fingers prior to my invention which entered the guide and seized a blank by the shank, nor any which were thrust into the guide and actually passed between the lowest blank and the one next above, nor any which were thrust into and through the guide by a yielding pressure, nor any which enter the guide at right angles thereto by means of operative mechanism which thrusts the fingers into and through the guide, moves them downward toward a holder, retires them longitudinally, and replaces them in their original position ready to repeat the operation.

I am also aware that multiple blank-holders intermittingly revolved have been used before in such machines in connection with revolving tools of various kinds for operating upon different portions of the blank in making a bolt or screw; also that multiple blank-holders intermittingly revolved have heretofore been provided with hand screw-chucks, and also with simple lateral apertures for receiving a bolt-blank endwise, as shown in English Letters Patent No. 4,276 of A. D. 1874; but I know of no prior machine in which the multiple blank-holder had radial jaws, as herein shown, or which held each blank by the shank in a line parallel with the axis of the jaw pivot or axis, so that the head and point could be dressed and finished and the thread cut while the blank was still held by the holder, although

these several operations have heretofore been performed in machines which operate on rods and cut therefrom the screw or bolt during an advanced stage in its manufacture; and said operations are also capable of being performed progressively on single blanks with the machinery described in the before-mentioned English Letters Patent; but therein the blanks can only be fed by hand, and to hold them securely or to discharge them when finished requires either manipulation or the devising of special mechanism which can control the blanks bodily, instead of permitting them to be discharged by their gravity, as with radial jaws.

I am also aware that threading-dies have heretofore been mounted in revolving heads and controlled by sliding rods; but so far as my knowledge extends no revolving head-dressing tool for working on bolts or screws has heretofore been provided with jaws, inclined planes, springs, and a sliding yoke, as herein described, whereby the tools may be adjusted to conform to the particular size of head desired and progressively advance to their work.

I do not limit myself to the special construction of the several parts of the machine as fully described, but mean to include all mere formal variations, accomplishing the same result by equivalent mechanical means.

What I claim as my invention, and desire to secure by Letters Patent, as improvements in screw-making machines, is—

1. The combination, with a conveyer-guide provided with one or more spring-checks, each having a V-shaped face, for supporting the blanks within the guide, of feeding-fingers adapted to seize a bolt by the shank, and the mechanism, substantially as described, which causes the fingers to enter the guide, seize the lowest blank therein, and remove the same by a downward vertical movement, substantially as described.

2. The combination, with a conveying-guide for a column of screw or bolt blanks, of the feeding-fingers and the operative mechanism, substantially as described, which thrusts said fingers longitudinally into the conveyer-guide to seize a blank, moves them away from the guide for delivering the blank to a holder, retires them longitudinally, and then replaces them in their original position, said fingers during these movements describing substantially the figure of a rectangle, substantially as described.

3. The combination, with the conveying-guide provided with spring-checks for containing a column of blanks, of the spring-fingers and mechanism actuated by a spring or weight for forcing said fingers longitudinally into and through the guide, between the checks, preparatory to the removal of a blank, substantially as described.

4. The combination of the conveyer-guide for holding a column of blanks, the spring-checks for holding up the column, the feeding mechanism, as described, for seizing and taking out the undermost blank, and the rigid bars or comb-teeth 21, for protecting the spring-checks against the effect of the thrust of the feeding-fingers in entering the column of blanks, substantially as described.

5. The combination, with a conveyer-guide for holding a column of blanks, of two sets of inclined planes, 25 and 28, arranged facing each other, and so that the flanged head of each screw or bolt blank, when near the bottom of the guide, shall pass between such planes, and the blank thereby be adjusted lengthwise in position preparatory to being seized by the feeding mechanism for transference to another portion of the machine, substantially as described.

6. The combination of the following instrumentalities or organisms: an intermittingly-revolving blank-holder provided with radial jaws to receive and hold a number of bolt or screw blanks by grasping each between head and point, mechanism for feeding blanks to said holder, mechanism for discharging the finished bolt therefrom, a revolving tool for dressing the heads, and revolving tools for pointing the ends and threading the shanks of blanks, the arrangement of the mechanism and the location of the tools being such that blanks are automatically delivered to and grasped by the holder, and while so held by said holder, presented consecutively to the several tools operating simultaneously on different blanks, and automatically discharged from the holder when finished, substantially as described.

7. The combination, with an intermittingly-revolving blank-holder provided with two or more radial jaws, of the feeding-fingers and the cam, weight, and lever for operating them, substantially as described, whereby the fingers are made to move for the insertion of a blank into the jaw of the holder in a plane radial to the axis of the holder, and to deliver the blank with its axis parallel with the axis or pivot of the jaw, as set forth.

8. The combination, in an intermittingly-revolving blank-holder of a screw or bolt machine, of a hinged spring-jaw and its lever 37, co-operating with a stationary jaw to hold a blank, a locking-arm, Fig. 10, and a vibrating finger, 45, to move the locking-arm, substantially as described.

9. The combination of an intermittingly-revolving blank-holder, a series of radial hinged spring-jaws, each co-operating with a stationary jaw to hold a blank, a locking-arm to each spring-jaw, and a stationary projecting cam-face, 110, acting successively upon each locking-arm to unlock its particular jaw for releasing a finished bolt or screw, substantially as described.

10. The improved mechanism for dressing the heads of a bolt or screw blank, consisting of a pair of jaws in which suitable cutting-tools are mounted, hinged to a revolving head, springs to cause said jaws to open, a yoke capable of a longitudinal sliding movement, combined with inclined planes upon the backs of

the jaws, and with an adjustable sliding rod, cam, and lever, for operating said yoke, whereby the cutting-tools can be made, by sliding said yoke along such inclined planes, to vary the relation of the cutting-faces to each other, constructed and combined substantially as described.

11. The combination, with the compound head-dressing tool provided with a sliding yoke, as described, of the rod 67, connected with said yoke, and the cam 72, for automatically governing the progressive movement of said yoke and the parts of the tool controlled thereby, substantially as described.

12. The improved mechanism, as described, for threading the shank of a bolt or screw blank, consisting of separable threading-dies mounted, respectively, upon radius-arms, adjusting-screws 87, and sliding locking-bars 88, combined with such dies, respectively, for determining the extent to which such dies shall separate, and for locking them in position, substantially as described.

13. The combination, with a compound threading-tool provided with locking mechanism, as described, of a conical-headed rod, 94, operated by suitable mechanism, as described, for unlocking the threading-dies and causing them to separate radially to clear the thread which they have cut, substantially as described.

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