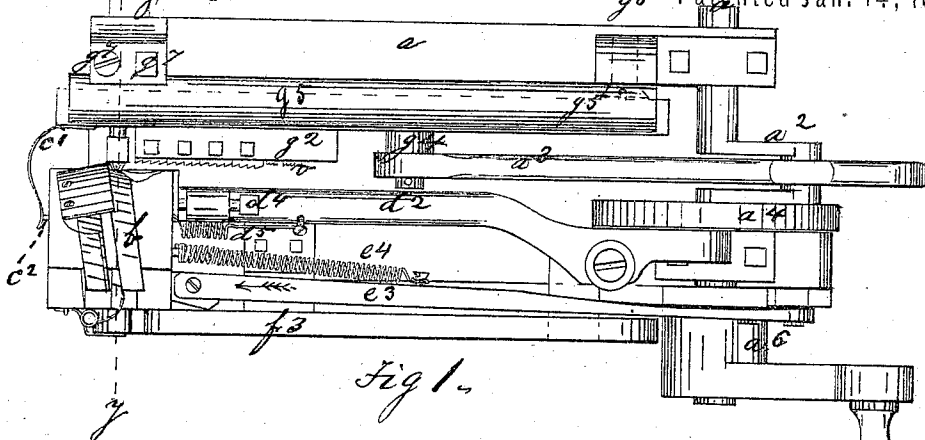


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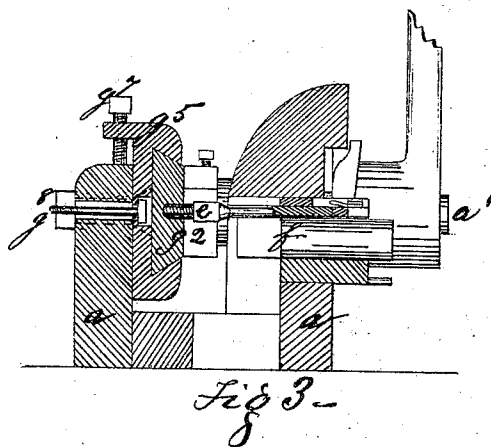
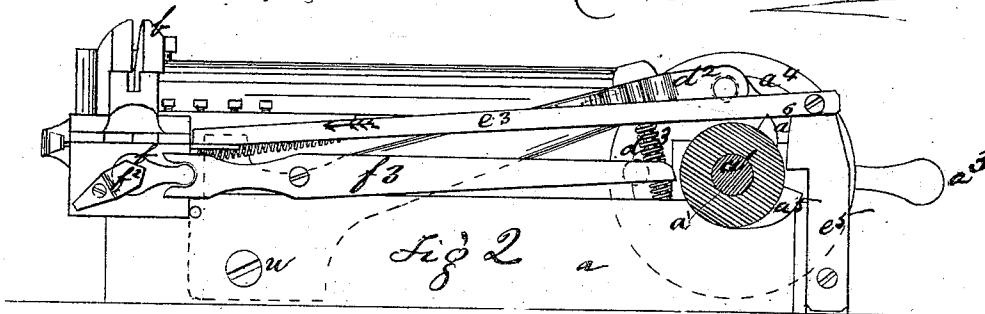
Machines for Slotting the Heads of Screws.

No. 134,818.

96 Patented Jan. 14, 1873.



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J. A. Ayres } Inventors
per Henry B. Remick } In presence of
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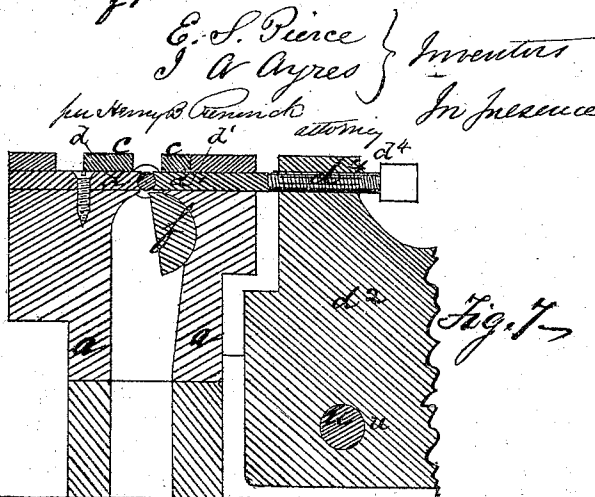
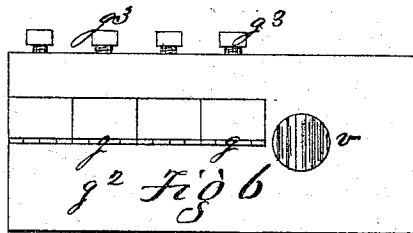
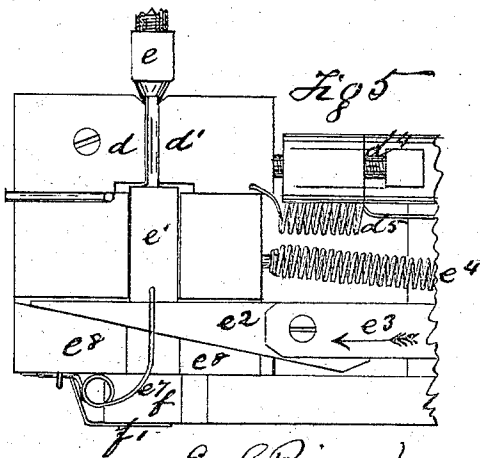
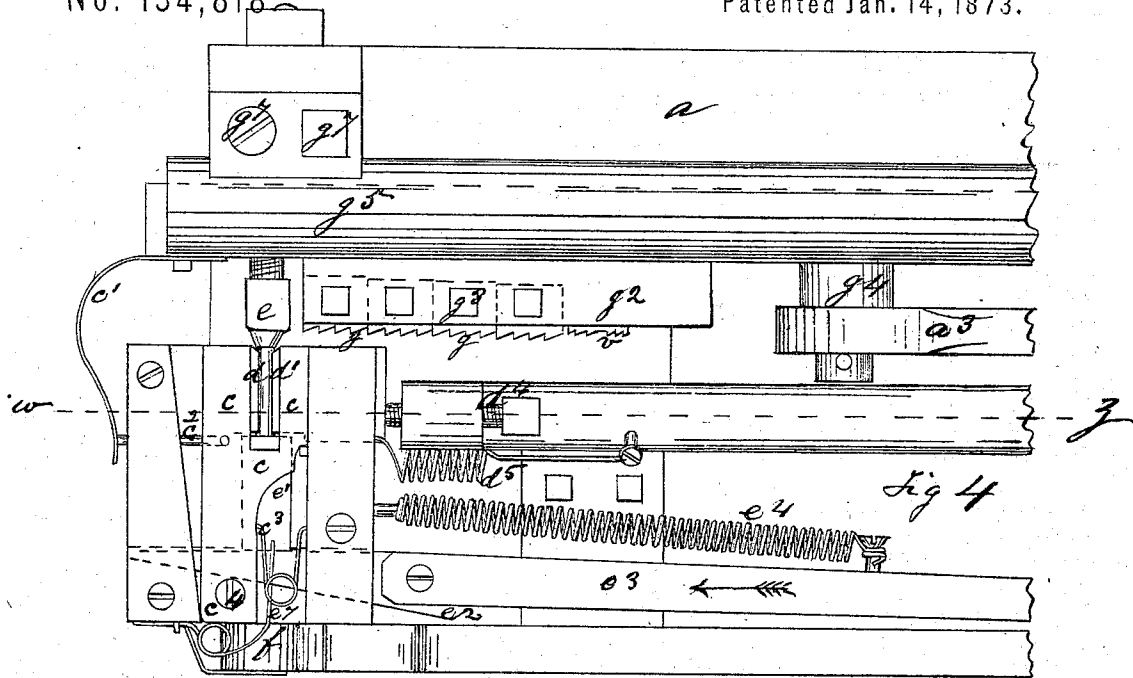


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Machines for Slotting the Heads of Screws.

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permy B. Remick attorney

In presence of

M. Remick
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UNITED STATES PATENT OFFICE.

ELIJAH S. PIERCE, OF HARTFORD, AND JARED A. AYRES, OF GROTON, ASSIGNORS TO NATIONAL SCREW COMPANY, OF HARTFORD, CONN.

IMPROVEMENT IN MACHINES FOR SLOTTING THE HEADS OF SCREWS.

Specification forming part of Letters Patent No. 134,818, dated January 14, 1873.

To all whom it may concern:

Be it known that we, ELIJAH S. PIERCE, of the city of Hartford, in the county of Hartford and State of Connecticut, and JARED A. AYRES, of Groton, in the county of New London and State of Connecticut, have invented a new and useful Apparatus for Planing Slots in Screw-Blanks, such apparatus being useful chiefly in the manufacture of wood-screws; and that the following, taken in connection with the drawing, is a full, clear, and exact description thereof, the drawing exhibiting the apparatus in the form preferred by us.

In the drawing, Figure 1 is a plan or top view of the whole machine; Fig. 2 is a side elevation thereof; Fig. 3 is a vertical cross-section on the line xy of Fig. 1; Fig. 4 is a plan, on a large scale, of parts of the machine, the parts above the transferrer being removed; Fig. 5 is also a partial plan, the parts above the gripping apparatus and the locating apparatus being removed; Fig. 6 is an elevation, on a large scale, of the slotting-tool and the rasp; and Fig. 7 is a partial longitudinal section on the line wz of Fig. 4.

In the manufacture of wood-screws by machinery, the usual if not the only method of slotting the blanks is by means of machinery, in which the heads are subjected to the action of revolving circular saws, while the blank is gripped between the jaws. In the machinery devised by us, the blank is gripped between jaws moved to open and shut automatically, and while so gripped is acted upon by a planing-tool, or, more correctly speaking, a slotting-tool, moving in a right line, or nearly so, each cutter in the tool cutting to a different depth, so that each cutter planes off its own shaving, and the slot is finished when the whole tool has traversed over the face of the blank. In the preferred form of the apparatus, we combine together, first, a pair of ways or contrivances for holding a pile of screw-blanks; second, a transferrer for taking the blanks out of the pile and transferring them to the gripping apparatus; third, an apparatus for locating the head of the blank in proper position with respect to the planing-tool, and holding it there so that all slots shall be cut to the same depth irrespective of irregularities in the

length of the blank, and in spite of any tendency that it may have to slip in the grasp of the gripping-jaws; fourth, a gripping apparatus so connected by mechanical means with the tool that it holds the blank gripped while the tool is performing the work, and releases the blank after the slot is cut; fifth, a planing or slotting tool, consisting of a series of teeth or single planing-tools moving in a right line, or nearly so, and with the teeth so arranged with reference to each other that each tooth cuts deeper into the screw-head than the tooth which preceded it; sixth, a rasp or flat planing-tool which removes the burr formed in the operation of planing out the slot; and, lastly, a discharging apparatus which permits the blank, after it has been slotted, to drop out of the machine when the gripping-jaws are opened.

In the machine represented in the drawing, the frame which serves as a bed-plate is represented at aaa , and the main shaft from which the motions of all parts of the machine are derived at a^1a^1 . This shaft has mounted upon it a crank, a^2 , which, by the aid of a connecting-rod, a^3 , actuates the slide which supports and moves the planing-tool. On the same shaft are secured three cams, $a^4a^5a^6$, by means of which proper motions are given to the gripping-jaws, the locating apparatus, and the discharging apparatus, the transferrer being actuated by a motion derived from the slide which carries the cutters. The rasp v for removing the burr is mounted upon and moves with the slide of the slotting-tool. A pair of ways, in which the pile of blanks is held, is represented at b . These ways may be mounted upon the bed-plate or held in position in any proper way, and in practice we intend to combine any known form of arranger with them which will arrange the screws and deposit them in the ways. Just below the lower end of the ways lies the transferrer c . (See Figs. 4 and 7.) This is a slide or vibrating piece of metal with a slot through it, and it moves from under the ways over the space between the gripping-jaws and back again, being actuated in one direction by the arm c^1 , which strikes against a pin, c^2 , attached to the transferrer, and in the opposite direc-

tion by the spring c^3 . We prefer to use a transferrer vibrating about a center pin, as at c^4 . The action of this transferrer is as follows: When its slot is under the opening on the ways it receives a blank as it moves toward the griping-jaws; it carries the blank along with it, and shuts up the opening in the ways so that no more blanks can drop for the time; and when its slot arrives over the opening between the griping-jaws it permits the blank to drop between them, and when the proper time arrives goes back again to receive another blank from the ways.

The griping apparatus consists of two jaws, one by preference stationary and the other movable, although both jaws may move. These jaws are represented at d d^1 , Figs. 4, 5, and 7. The stationary jaw is secured to the bed-plate, and the moving jaw is actuated by the arm d^2 , pivoted at u , which receives its motions from the cam a^3 and the spring d^3 . This spring and cam so act upon the arm d^2 , which acts upon the moving jaw through the set-screw d^4 and spring d^5 , that the apparatus is open when the slot in the transferrer arrives over the space between the jaws, that it gripes the blank before the slotting-tool commences to act, and while it is acting, and also during the action of the burring-tool if that be used, and then releases its grasp upon the blank. The arm d^2 has a rocking motion, and is not connected positively to the moving jaw, but has a set-screw in its end, which bears against the jaw, so that the arm, when lifted by the spring d^3 , moves the jaw and gripes the blank. When the arm is pressed down by the cam it, through the intervention of spring d^5 , opens the jaws.

Now, it will be obvious to those acquainted with wood-screw machinery that both jaws of the griping apparatus may be moved instead of one only; also that these jaws may be so moved that one or both of them shall act as a transferrer, the screw dropping directly from the ways between the jaws, and also that the jaws might slide over a gap or slit in a plate in such manner (as well known) that the blank would drop through the slit when the jaws had moved from the position where the blank was slotted, and relaxed their gripe upon the blank before arriving over, or when they arrived over, the slit. It therefore follows that a machine could be made without either a separate transferrer or separate discharging apparatus, and we have so contrived one, but prefer a separate transferrer and discharger. Other means known to mechanics for converting a continuous circular motion into an interrupted reciprocating one may be substituted for those represented and described, so long as the jaws are opened at the proper time to receive the blank and permit its discharge and gripe the blank while the head is being slotted, the motions of the slotting-tool and the griping apparatus being always so timed by reason of the connection between them that the tool shall cut while the blank is

clamped, and we intend to use other contrivances than those specially described for thus combining together the slotting-tool and the griping apparatus.

The locating apparatus consists in its preferred form of a projection, e , a follower, e^1 , and a wedge, e^2 , the latter actuated by an arm or connecting-rod, e^3 , which is moved to withdraw the wedge by the cam a^6 , and to insert it by the spring e^4 ; the cam a^6 does not act directly upon the connecting-rod, but upon a lever, e^5 , to which this rod is pivoted. The follower is moved toward the blank by the wedge, and away from it by a spring, e^7 . (See Fig. 5.) In the preferred form the projection or stop which defines the position longitudinally of the head of the blank to be slotted is a set-screw attached to and moving with the slide that carries the slotting-tool; it comes opposite the blank just after it has been deposited between the griping-jaws and before those jaws have closed upon it; its head may be slightly rounded so as to shove the blank in the direction of its point if it project too far from the jaws; but we prefer always to drop the blank with its head a little too near the jaws. When the blank is between the jaws, and while its head is opposite the stop or part thereof, the cam a^6 releases the lever e^5 and arm e^3 . The spring e^4 then draws e^3 , and consequently the wedge, in the direction of the arrows, and the wedge shoves the follower, and the follower the blank, out from between the jaws until its head presses against the stop, the blank now lying with its point against the follower and its head against the stop. Now this motion to shove the wedge, and consequently the follower, and therefore the blank, against the stop, is a spring motion, and screw-blanks of different lengths may therefore be located with their heads always against the stop, and consequently in proper relation to the slotting-tool.

We intend, sometimes, to dispense with the follower, which is a slide lying between the wedge and the blank, and to permit the wedge to act directly upon the blank. We intend, also, to use a cam or an eccentric in place of the wedge, and also to mount the stop in some stationary part of the machine; but in that case its head must be of such shape and so located that it touches upon some part of the head of the blank which is not acted upon by the slotting-tool. We also intend to actuate the wedge or its equivalent by other devices than those specially shown; but the motion to locate the blank must always be derived from a spring or yielding connection, as it is clear that the wedge must occupy different positions when locating blanks of different lengths. The wedge may be retracted at any time after the blank is gripped if the apparatus is to act as a locating apparatus only; but we prefer to use the wedge as a holder while the head of the blank is being slotted, thus preventing the blank from being

moved endwise between the jaws by the action of the slotting-tool, and insuring a proper depth of slot. This function of the wedge is the most important one, as other and yielding devices might be used for locating only, but the wedge moving across the jaws and held firm by stationary guides, such as e^8 e^8 , furnishes an unyielding support for the blank, preventing all longitudinal deviation from the true position while being slotted. When the wedge is used as a holder it is not retracted until after the slot is cut in the blank, and it is plain will hold the blank properly in a longitudinal direction, even if the griping-jaws fail to perform this function.

We believe this apparatus for locating and holding the blank by the use substantially of a stop at its head and a wedge at its point to be entirely new, and intend to apply and use it in slotting-machines which are furnished with circular saws.

When the blank is deposited by the transferrer between the griping-jaws it rests upon an oscillating cylinder, which has a slab cut off one side of it, and is so located in the machine that the round part thereof forms a support for the blank. This cylinder projects out from the frame of the machine, is held in place by a keeper, f^1 , and has upon its end an arm, f^2 , acted upon by a vibrating lever, f^3 , which falls by gravity, and is lifted by the cam a^6 .

When the griping-jaws open after the screw is slotted the cam a^6 acts upon the lever-arm and rocks the cylinder so that its surface moves from under the blank, and the latter drops out of the machine. Any proper mechanism may be employed for working the cylinder, which is the discharging apparatus, in place of that specially described, and we intend at times to substitute a slide for the cylinder, and at others to use other known dischargers; and sometimes to dispense with a distinct discharger entirely, causing the jaw so to move after the screw is slotted as to carry the blank over a slot, and thus become a discharging apparatus.

The saw or series of slotting-tools may be made in one piece or in several pieces. We prefer to make it in several pieces, four teeth in a section. (See g g , specially, at Figs. 4 and 6.) These pieces are laid on a sort of ledge or shelf in the saw-stock g^2 , and are held in place by blocks or followers acted upon by set-screws g^3 g^3 . These pieces or sections may have packing applied behind, below, or on top of them, if necessary, and should be either made originally, or so adjusted in the carriage with reference to its line of motion and the plane in which the head of the blank lies, that each tooth will make a deeper cut in the screw-head. The saw-carriage has an arm or pin, g^4 , upon it, which is embraced by the connecting-rod a^3 , and as the crank a^2 revolves the saw or series of slotted tools reciprocates. This saw-carriage has secured upon it the rasp v , and when

the slot is finished the rasp passes over the face of the head and removes the burrs. In order to adjust the series of slotting-tools so that they shall always cut on a diameter of the head, we mount the saw-carriage so as to slide in an adjustable way, g^5 , pivoted, as shown by dotted lines g^5 , to one side of the frame; this pivot is in the center of the ways, measuring vertically, or nearly so; the other end of the ways is supported and secured by set-screws g^7 g^7 , and a bolt and nut, g^8 , passing through the ways and side of the frame secure the ways in place when adjusted. This whole contrivance is useful only for adjusting the ways and securing them in position when adjusted, and other arrangements of set-screws, wedges, or their equivalents arranged in the same or different ways, may be used to effect the same purpose.

The operation of the whole machine is briefly as follows: First, the blank drops into the slot of the transferrer; second, the transferrer carries it over and permits it to drop into the opening between the griping-jaws, the blank then resting upon the cylindrical part of the discharger; third, the locating-wedge locates the blank while the stop is opposite its head; fourth, the griping-jaws close and grasp the blank; fifth, the series of slotting-tools advance and slot the nick; sixth, the rasp, following them, smooths off the burr; seventh, the jaws open after the blank is slotted and smoothed; eighth, the discharger oscillates and drops the blank out of the machine.

We prefer so to set or form the slotting-teeth that the slot or nick is widest at bottom; but also intend to use tools which will slot the nick of even width from top to bottom.

We claim as our invention—

1. A reciprocating saw or series of slotting-tools, in combination with a pair of griping-jaws, when the same are so connected by machinery, substantially such as described, that the jaws close automatically and hold the blank at the time when the saw moves over the face thereof to cut the slot, the combination being substantially such as described.

2. In combination, a reciprocating saw or series of slotting-tools, a griping apparatus, and a rasp, all being and acting substantially as specified.

3. In combination, a wedge and a stop, acting substantially as described, to locate the blank, the wedge also serving to prevent endwise displacement during the operation of slotting, the combination being substantially as specified.

4. The combination of a wedge and a stop with a pair of griping-jaws which gripe the blank after it is located, the combination being substantially such as specified, and acting to locate the blank and hold it against both lateral and endwise displacement while being slotted.

5. In combination, a transferrer, a pair of griping-jaws, a discharger, and a reciprocating

ing saw, all being and acting substantially as specified; and, in combination with these elements, we claim a rasp, acting as described.

6. In combination with a reciprocating slotting device or saw and a pair of gripping-jaws, adjustable ways in which the saw-carriage slides, whereby the saw may be so adjusted as to move in proper relation to blanks held between the gripping-jaws, all these parts be-

ing and acting in combination substantially as specified.

In testimony whereof we have hereunto subscribed our names.

ELIJAH S. PIERCE.
J. A. AYRES.

In presence of—

F. CHAMBERLIN,
THEODORE LYMAN.