(No Model.) 4 Sheets—Sheet 1.

# G. E. WITHERELL.

## SCREW HEAD SLOTTER.

No. 511,830. Patented Jan. 2, 1894.

Fig. 1.

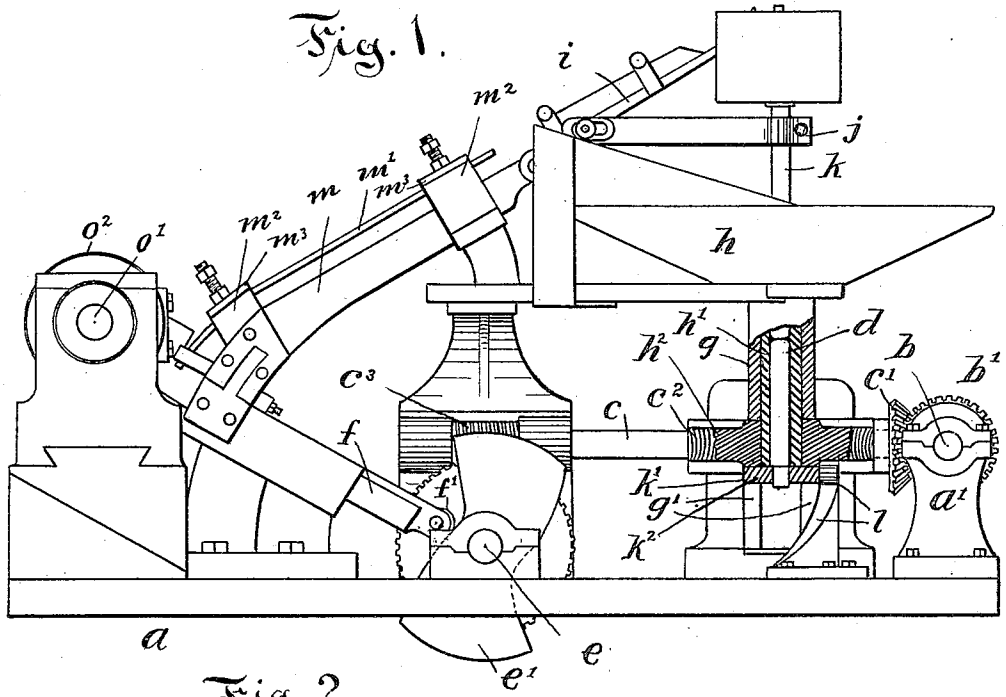
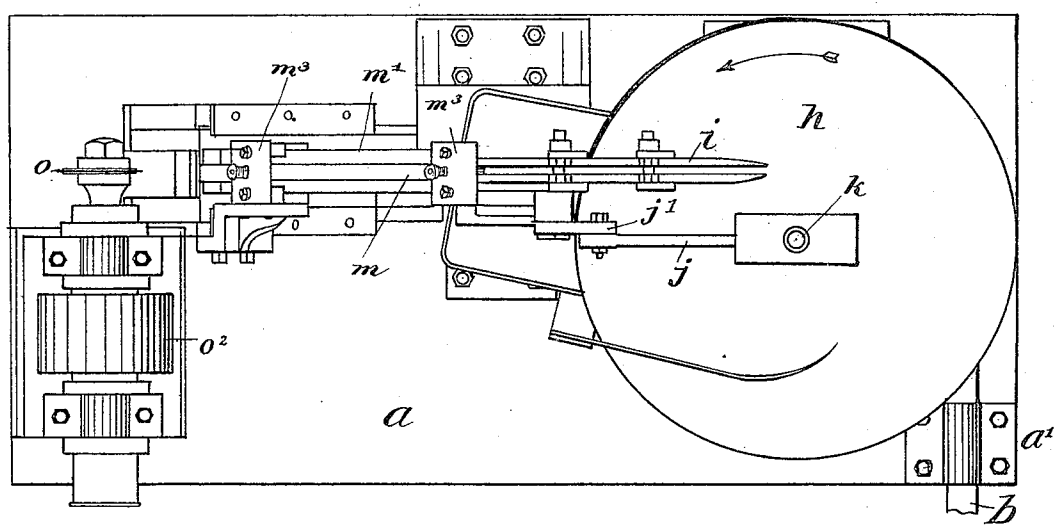



Fig. 2.

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WASHINGTON, D. C.

(No Model.) 4 Sheets—Sheet 2.

# G. E. WITHERELL.

## SCREW HEAD SLOTTER.

No. 511,830. Patented Jan. 2, 1894.

Fig. 3.

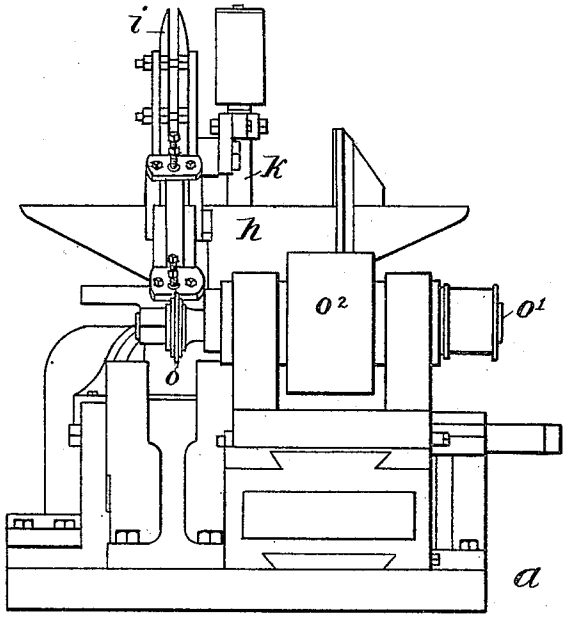



Fig. 4.

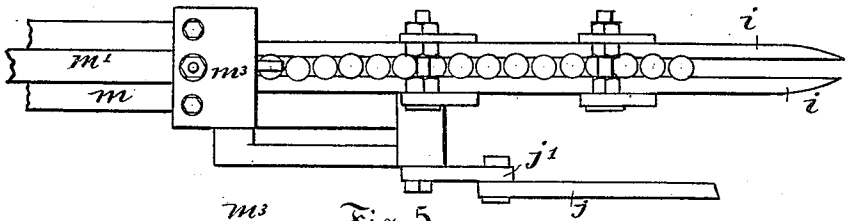
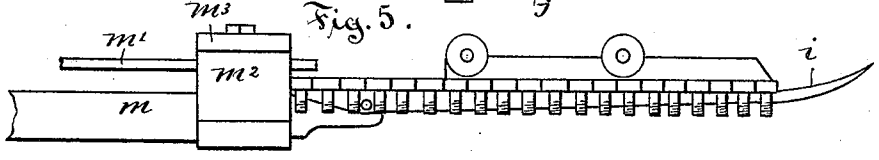



Fig. 5.

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(No Model.)

4 Sheets—Sheet 3.

# G. E. WITHERELL.

## SCREW HEAD SLOTTER.

No. 511,830. Patented Jan. 2, 1894.

Fig. 6.

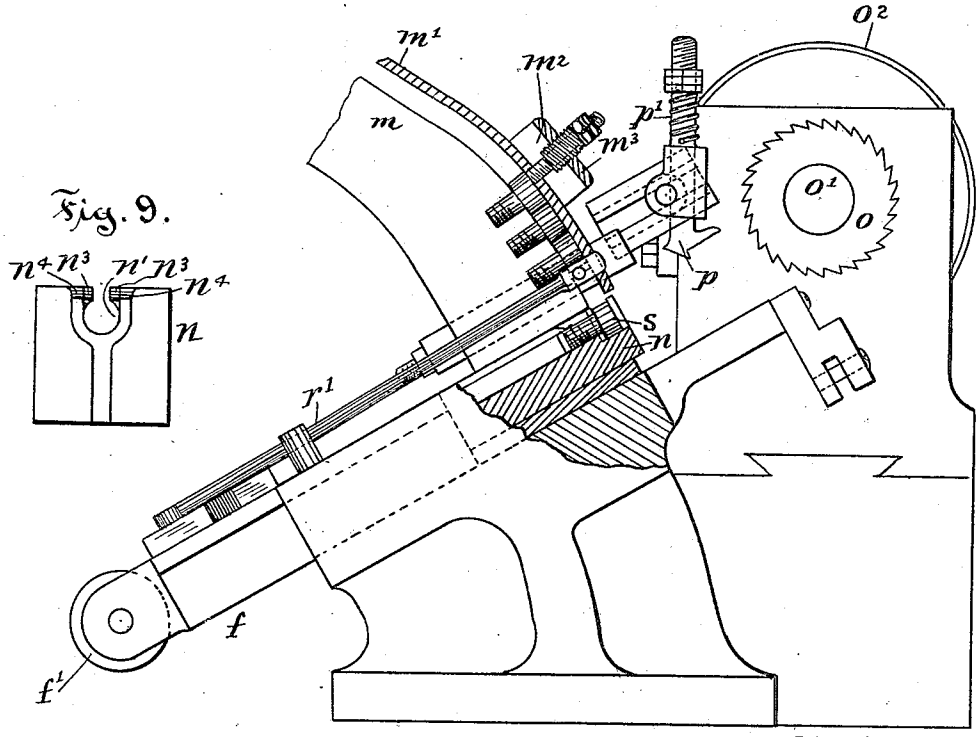



Fig. 9.




Fig. 7.

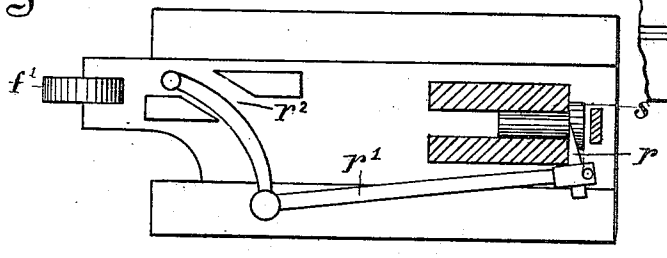
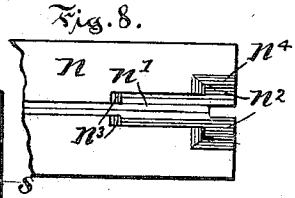



Fig. 8.

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## SCREW HEAD SLOTTER.

No. 511,830. Patented Jan. 2, 1894.

Fig. 10

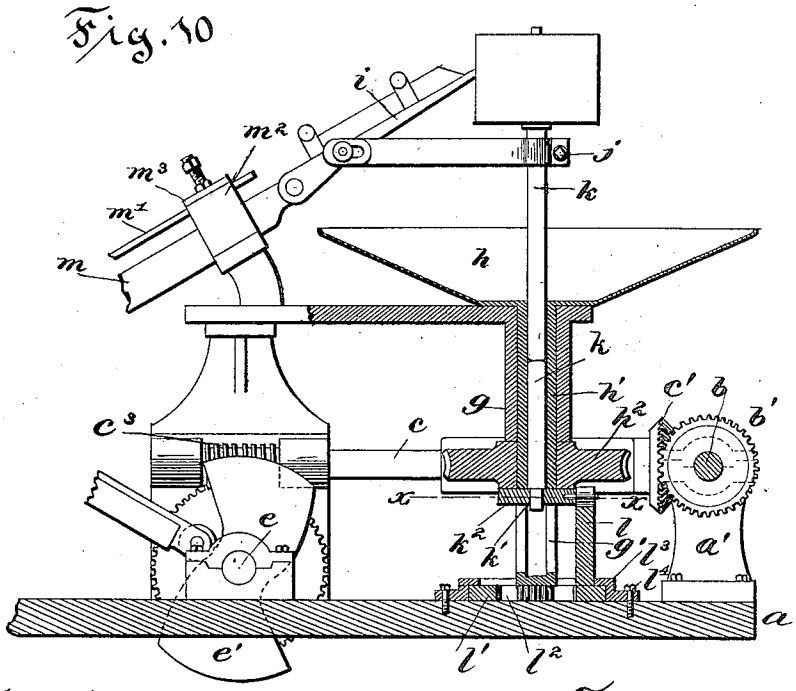



Fig. 11

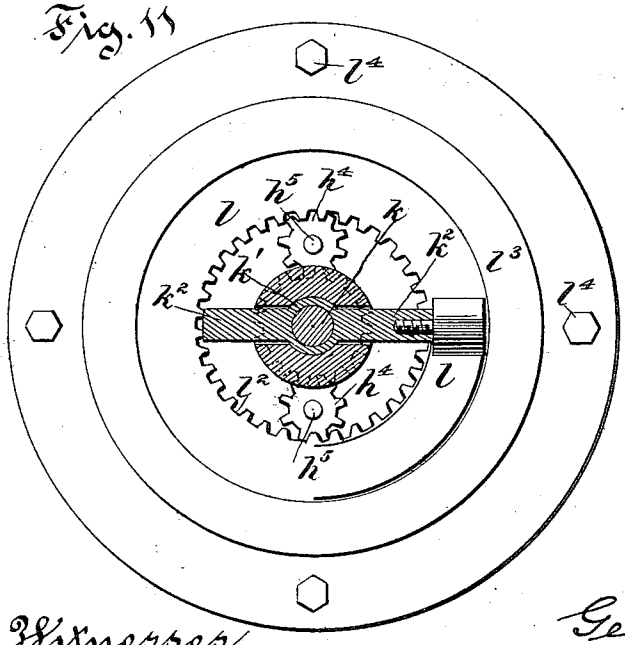
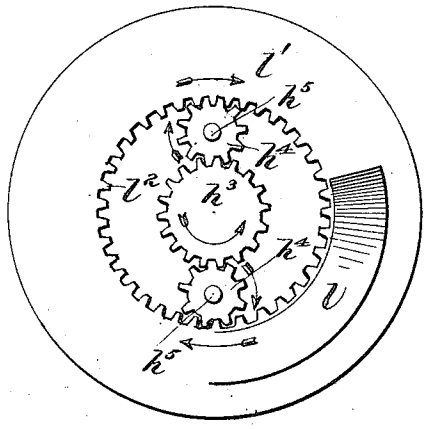



Fig. 12

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# UNITED STATES PATENT OFFICE.

GEORGE E. WITHERELL, OF HARTFORD, CONNECTICUT, ASSIGNOR TO THE HARTFORD MACHINE SCREW COMPANY, OF SAME PLACE.

## SCREW-HEAD SLOTTER.

SPECIFICATION forming part of Letters Patent No. 511,830, dated January 2, 1894.

Application filed July 29, 1893. Serial No. 481,797. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE E. WITHERELL, of Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Screw-Head Slotters, of which the following is a full, clear, and exact description, whereby any one skilled in the art can make and use the same.

The object of my invention is to provide a screw slotting machine that shall be simple and compact in form and direct in the action of the blank holding parts and also one in which the blanks may be picked up from the hopper by automatic fingers without clogging the mechanism; and my invention consists in the details of the several parts making up the machine as a whole and in the combination of such parts as more particularly hereinafter described and pointed out in the claims.

Referring to the drawings: Figure 1 is a detail view in rear elevation of the slotting machine with a part broken away to show construction. Fig. 2 is a detail top or plan view of the machine. Fig. 3 is a detail view in end elevation of the machine looking from the cutter end. Fig. 4 is a detail plan view of the fork that lifts the blanks from the hopper. Fig. 5 is a detail side view of the fork with part cut away to show the blanks. Fig. 6 is a detail view in side elevation of the carrier bed and slide with parts cut away to show construction. Fig. 7 is a detail plan view of the carrier with parts broken away to show construction. Fig. 8 is a detail plan view of the end of the blank clutch. Fig. 9 is an end view of the blank-chuck. Fig. 10 is a side elevation of a portion of the machine, showing the hopper and associated mechanism in section. Fig. 11 is a detail plan view on enlarged scale of the loose ring, cam, and the driving cogs of the hopper revolving device. Fig. 12 is a plan view of the cam-ring removed from its seat, and showing the gearing therein.

In the accompanying drawings the letter *a* denotes the bed of a slotting machine on which are supported the several mechanisms employed in removing a blank from a hopper, conveying it automatically to the chuck and cutting the slot in the head. On this bed is mounted a main shaft *b* in bearings *a'*, one end of this shaft bearing a bevel gear *b'* that meshes with a bevel gear *c'* borne on the end of a worm shaft *c* mounted in suitable bearings on the bed and arranged transversely to the main shaft *b*. This shaft *c* bears a worm $c^2$ in mesh with a worm gear on the hopper shaft *h'* and a worm $c^3$ that is in mesh with a worm-gear fast to the cam shaft *e* which bears a cam *e'* by which the carrier slide *f* is driven.

The main shaft *b* is driven from any suitable source of power, being usually mounted on the outer end of the shaft in convenient position to receive a belt from the countershaft.

Fast to the bed of the machine is a hollow standard *g* that supports a hopper *h*, the hollow shaft *h'* of which extends downward through the hollow standard and is arranged to permit a rotary movement of the hopper which is supported on the upper end of the shaft. To the shaft *h'* of the hopper is secured a worm gear $h^2$ in mesh with the worm $c^2$ on the worm-shaft *c* and arranged to drive the hopper from the shaft *c*.

The feed device for conveying the screw blanks from the hopper to the cutter comprises in part a fork *i* hinged to the upper end of the guide-way and connected by a rigid arm *j* to a weighted rod *k* that is arranged in a lengthwise socket in the hollow shaft *h'* of the hopper and is made in two pieces so as to enable the fork *i* to be retained in the position shown in Fig. 1 to discharge the blanks into the guide-way without regard to the particular rotary movement or position of the hopper *h* while the blanks are thus being fed into the guide-way. The end of the lower section or part of the rod *k* is secured to a disk *k'* having arms $k^2$ that extend outward through slots *g'* formed on opposite sides through the wall of the standard. One of these arms overlies and is adapted to move along a cam *l*, the surface of which is so fixed and arranged with relation to the rotary movement of the hopper shaft as to cause a vertical reciprocation of the rod *k* by this movement of the projecting arm $k^2$ along the sloping surface of the cam. The relative position of these parts is clearly shown in Fig. 1 of the drawings. By making the rod in two parts as shown it is obvious that the lower part

bearing with it the disk $k'$ will move readily up and down always lifting the upper portion of the rod with it, but being free to drop back without regard to whether the fork $i$ and upper portion of the rod are or are not locked or held at the upper extent of their play.

By making the rod $k$ in two parts the arm at the lower end thereof maintains constant contact or engagement with the face of the cam $l$, and will always be in position to operate without jar or shock. If the rod $k$ were made in a single piece and the feed-fork should happen to be released at the time the lowest part of the cam was under the end of the rod, the connecting parts would drop with a jar that would be liable to injure the parts. This construction of the rod in two parts does away with this.

The fork $i$ is hinged to the upper end of a sloping guide way $m$ that has a lengthwise groove in line with the groove or opening between the tines of the fork $i$ so that when the latter is lifted so as to slope downward toward the pivot the screw blanks will be discharged into the guide-way $m$ and will feed along through it turning in the guide-way that curves at the lower end as shown in Fig. 6 of the drawings so as to deliver the blanks successively into the grasp of the chuck $n$ that is secured in a socket in the front end of the carrier slide $f$. A cover $m'$ overlies the groove in the guide-way and is supported on studs $m^2$ that pass through a threaded sleeve held in a bridging piece $m^3$. The outer end of each stud $m^2$ is threaded and supports a lock and a clamp nut by means of which the position of the cover may be adjusted with reference to the thickness of the screw heads that pass along the guide-way. The rod $k$ is secured by a rigid arm $j$ to a crank arm $j'$ that is secured to the pivot on which the fork is supported, a pin connecting the arm $j$ and crank arm $j'$ passing through a slot in the arm $j$ so as to enable the up and down movement of the rod $k$ and arm $j$ to rock the pivot and swing the fork from a position with its end dipping into the contents of the hopper to the inclined position as shown in Fig. 1.

The carrier slide $f$ is driven by means of the cam $e'$, the end of the block being held so that a roller $f'$ borne thereon is in rolling contact with the face of the cam. The reciprocating movement of the slide $f$ is so timed as to move the slide forward so as to present the head of a screw blank $s$ to the saw $o$ and hold it in position a sufficient time to enable the saw to cut a slot across the upper surface of the head.

The saw $o$ is borne on a spindle $o'$ mounted in bearings and arranged to be driven at any desired rate of speed as by means of a belt from a countershaft passing over the pulley $o^2$ fast to the spindle $o'$. An adjustable ejector $p$ is mounted on the block that supports the saw spindle and held downward by means of a spring $p'$ in such position that when the carrier slide moves forward the head of a screw blank $s$ strikes against the bottom of the ejector and lifts it. As soon as the screw head has passed the ejector drops so that a hook or shoulder on its lower edge is in position in rear of the under part of the head of the screw and when the carrier slide moves back the ejector catches the screw blank beneath the head and throws it out of the hold of the clutch.

A cutoff $r$ is arranged to be temporarily held across the guide-way in the path of movement of the screws so as to prevent more than one feeding at a time into the chuck. This cutoff is borne on a bent lever $r'$ that is pivoted to the carrier bed, the rear end of the lever being in operative engagement with a cam groove $r^2$ formed on the upper surface of the carrier slide. The groove is so shaped that the forward movement of the carrier slide throws the cutoff out of the way of the blanks for a sufficient time to enable one of them to be dropped into the grasp of the chuck.

The chuck $n$ that is secured in the upper end of the carrier slide comprises what usually has been composed of two or more parts in a single block, all of the jaws of the chuck being made integral and a part of a single block if desired. This chuck is automatic in its operation and comprises a lengthwise socket $n'$, the outer end $n^2$ of which is enlarged so as to receive and hold the head of the screw blank, the socket being shaped to fit the blank on its under side and being also of a width to snugly hold the blank in place. The bottom and sides of the socket form what may be called the main jaw of the chuck, the other jaw $n^3$ being formed by lugs or projections that overhang the rear end of the socket and so arranged that they overlie the end of a screw blank $s$ when the latter is in place in the chuck. When a screw blank drops from the end of the guide-way into the socket in the end of the chuck it is aided by inclines $n^4$ that are preferably formed at the edge of the enlargement and also on the upper edge of the holding lugs on the walls of the socket. This construction of the chuck $n$ in one piece provides an extremely efficient and simple means of holding the screw blank and differs materially from former chucks in which the jaws are removable with respect to each other and require more or less mechanism to operate the parts to clutch and unclutch the screw blank in the operation of slotting the head.

By arranging the mechanism and the several parts of the machine as described a compact and durable construction of the whole is rendered possible.

The means preferred for preventing the piling up of the blanks in the hopper $h$ in front of the end of the fork $i$ comprises mainly a movable cam ring $l'$ on which the cam $l$ is mounted and the devices for revolving the cam ring $l'$. The cam ring $l'$ has an internal gear $l^2$ and is held against all except rotary motion by the flanged clamp ring $l^3$ or like

device secured to the bed as by means of screws or bolts $l^4$. On the lower end of the hopper shaft $h'$ a gear wheel $h^3$ is secured and this is in mesh with the idlers $h^4$ which are gears held on the pivot pins $h^5$ fixed in the bed $a$. The rotary movement of the hopper shaft $h'$ is transmitted by the intermeshing gears to the cam ring $l'$ and the latter moves so as to present a different part of the contents of the hopper to the fork each time the end of the latter drops into the hopper to take up a new supply of blanks. The hopper shaft revolves in one direction and the cam ring moves with the cam so that the rod $k$ is lifted at a new point in the circuit of the cam ring each time that the pin or roller carried by it encounters the cam $l$.

I claim as my invention—

1. In combination in a screw slotting machine a bed $a$, a main shaft $b$ having a bevel gear $b'$, a worm shaft with a bevel gear $c'$ in mesh with the gear $b'$, the worm $c^2$, $c^3$ appurtenant to the worm shaft, a hopper shaft $h'$ supporting a hopper and having a worm gear $h^2$ in mesh with the worm $c^2$, a cam shaft $e$ having a worm gear in mesh with the worm $c^3$ and a cam $e'$ also fast to the shaft, a reciprocating carrier block $f$ in operative engagement with the cam $e'$, and the blank feed and cutter mechanism, all substantially as described.

2. In combination with a supporting bed, a rotary hopper, a feed device for removing the blanks from the hopper, a vertical rod pivotally connected to the feed device and made in two sections, and the rod operating mechanism, all substantially as described.

3. In combination with a supporting bed, a rotary hopper having a hollow shaft, a lifter rod arranged within the shaft and made in two sections, the upper section connected with the feed device for removing blanks from the hopper and the lower section in operative connection with the cam whereby a reciprocating movement is imparted to the lifter rod, all substantially as described.

4. In combination with a supporting bed, a rotary hopper, a feed device arranged to remove blanks from the hopper, a lifter rod made in two sections, a projecting arm on the lower section of the lifter rod in operative contact with the cam, and a rotary cam turning about the lifter rod, all substantially as described.

5. A blank holding chuck comprising an open socket in the end of a block, the lower end of the socket having an overhanging lug whereby a blank located in the socket is held from tipping, all substantially as described.

6. A blank holding chuck comprising an open socket in the end of a block, the lower end of the socket having an overhanging lug whereby a blank located in the socket is held from tipping and the saw channel underlying and extending from the outer end of the socket, all substantially as described.

7. In a screw-head slotter the combination of a cutter, a blank-feeding mechanism, and a blank-holding chuck consisting of a single block having a lengthwise socket in the outer end formed to fit the head and shank of the screw-blank and open on one side and at the end and having fixed jaws integral with the chuck-block.

8. In combination with a cutter and its driving mechanism, a reciprocating carrier block, a guide-way for blanks, and a blank-holding chuck on the carrier-block, said chuck being formed with integral jaws and a screw-receptacle open on one side and at the end.

9. A blank holding chuck comprising an open socket in a block, the outer end of the socket being enlarged to receive and hold the head of a screw blank, the fixed lug at the inner end of the socket for holding the screw blank from tilting, and the guideways appurtenant to the blank socket, all substantially as described.

10. A blank holding chuck comprising an open socket in a block, the outer end of the socket being enlarged to receive and hold the head of a screw blank, a saw channel underlying and extending from the outer end of the socket, the fixed lug at the inner end of the socket for holding the screw blank from tilting and the guide-ways appurtenant to the socket, all substantially as described.

11. A blank holding chuck comprising an open socket in a block, the outer end of the socket being enlarged to receive and hold the head of a screw blank, the fixed lug at the inner end of the socket for holding the screw blank from tilting, and the guide-ways on the walls of the socket, all substantially as described.

12. In combination in a screw head slotter, a cutter and its driving mechanism, the blank feeding mechanism comprising a guide-way, a cutoff device arranged to deliver the blanks one by one to the blank holding chuck, a reciprocating carrier block, a chuck mounted on the carrier block and comprising a socket in the block having fixed holding jaws, integral with the chuck-block, all substantially as described.

13. In a screw head slotter in combination with a guide-way, the reciprocating carrier block, a cutoff lever mounted on the carrier bed and having an arm in operative engagement with a cam groove on the carrier block, the cutoff adapted to project across the line of movement of the blank in the guide-way, and a blank holding chuck borne on the carrier block, all substantially as described.

14. In combination with a movable blank holding chuck having fixed holding jaws, an adjustable extractor with its end projecting into the path of movement of the blank in the chuck, all substantially as described.

15. In combination with a movable blank holding chuck, an extractor adjustable in the direction of the line of movement of the chuck,

and with its end projecting into the path of movement of the blank in the chuck, all substantially as described.

16. The combination with the feed-fork and revolving hopper formed with a hollow vertical bearing shaft, of a weighted rod *k* having connection to the feed-fork, a vertically reciprocating rod to support the weighted rod *k*, a cam arranged at right angles to the lifter-rod and to rotate around the rod to engage and lift the reciprocating-rod, and means to rotate the cam substantially as described.

17. The combination with the feed-fork and the revolving-hopper formed with a hollow vertical bearing-shaft having vertical slots in its lower end, of a weighted-rod *k* disposed in the hollow-shaft of the hopper, a reciprocating-rod in the hollow shaft to lift the weighted-rod, an arm on the lower end of the reciprocating-rod arranged in the vertical slots of the hopper-shaft, a cam to engage the said arm, and means to rotate the cam and lift the rod, substantially as and for the purpose specified.

18. The combination of the feed-fork, the revolving hopper mounted on a vertical hollow shaft formed with vertical slots in its lower end, a weighted rod in the hollow shaft of the hopper, an arm connecting the weighted rod and the feed-fork, a vertically-movable and rotating rod in the lower end of the hopper shaft, an arm transversely mounted on the lower end of said vertical rod, and moving in the slots of the hopper shaft, a gear on the lower end of the hopper shaft, an internal gear-ring formed with a cam to engage the arm and lift the vertical movable rod, and gears to turn the gear-ring substantially as and for the purpose specified.

19. In combination with a revolving hopper having a hollow vertical bearing shaft, the hopper driving mechanism, the feed-fork, a reciprocable fork operating rod connected to it and extending within the hopper shaft, an arm fast to the vertical rod, a cam arranged in operative contact with the arm on the lifting-rod, and means for changing the position of the cam with reference to the arm on the rotary lifter-rod, all substantially as described.

20. In a blank feeding mechanism in combination with a movable hopper, a feed-fork, the reciprocable fork operating rod connected to the fork, a cam adapted to move the connecting rod on the feed-fork, and means for changing the position of the cam with reference to the lifter-rod whereby the repeated introduction of the feed fork into the hopper at substantially the same place is prevented.

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