

(No Model.)

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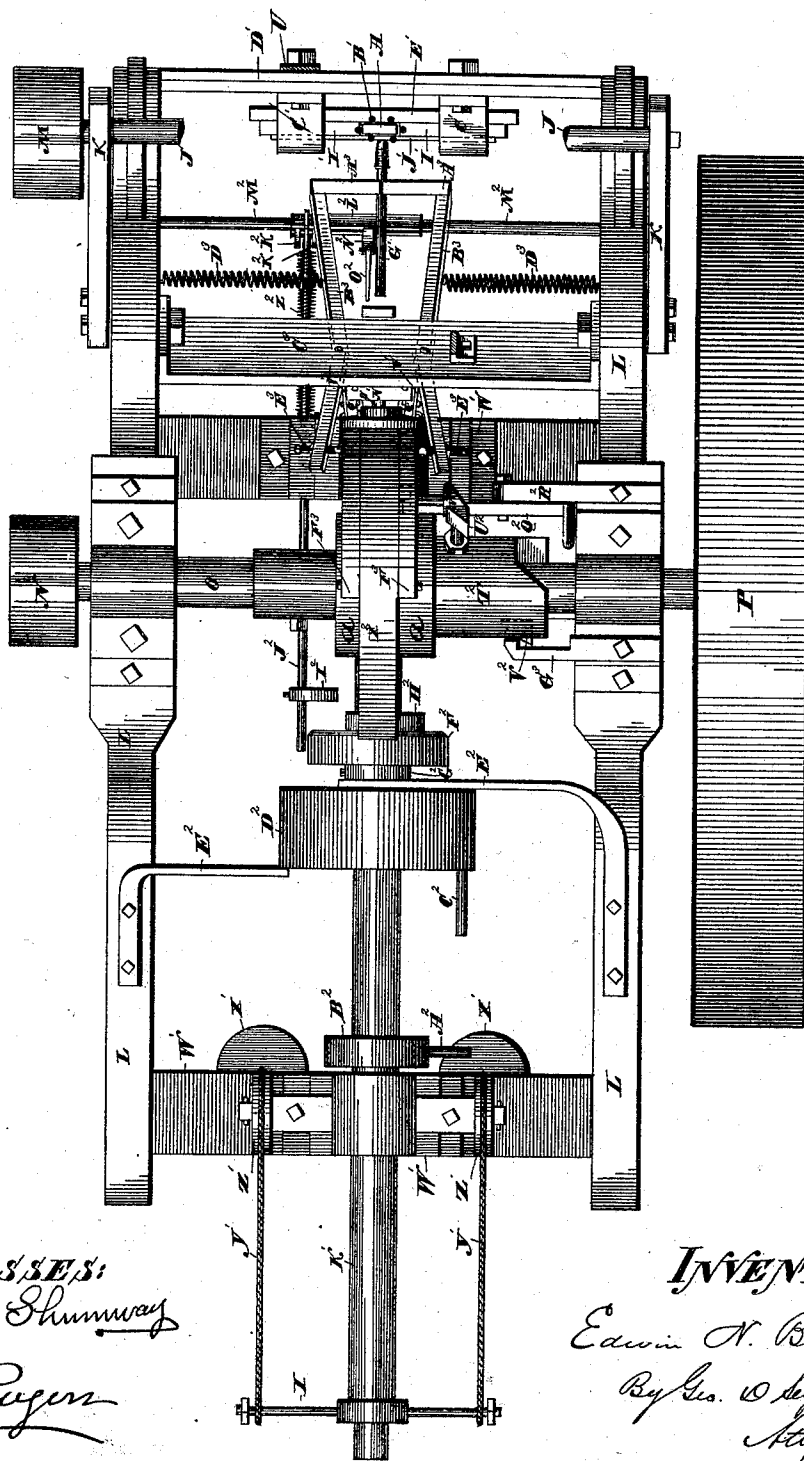
E. N. BEECHER.

MACHINE FOR TAPPING OR REAMING BLANKS.

No. 504,903.

Patented Sept. 12, 1893.

Fig. 1



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(No Model.)

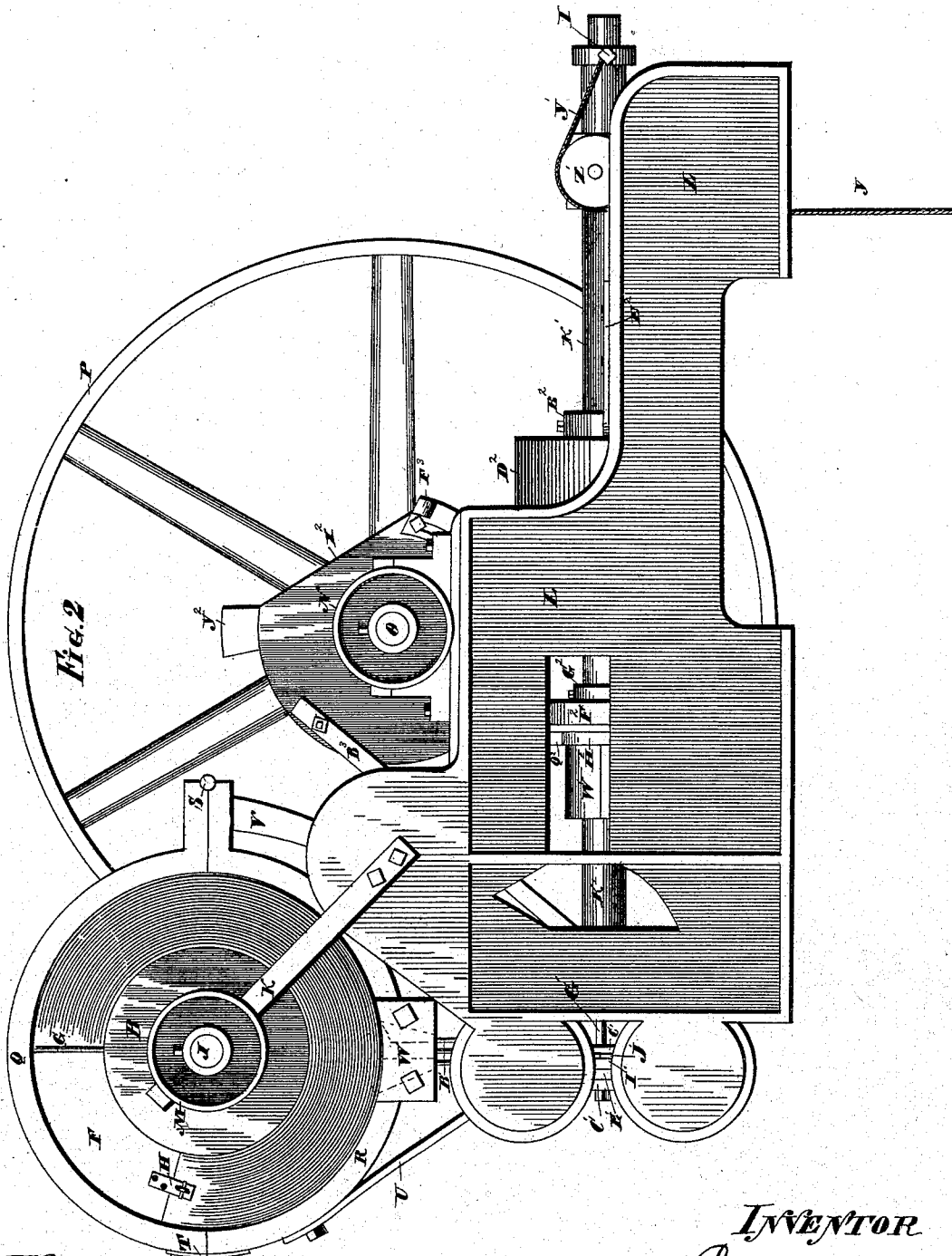
4 Sheets—Sheet 2.

E. N. BEECHER.

MACHINE FOR TAPPING OR REAMING BLANKS.

No. 504,903.

Patented Sept. 12, 1893.



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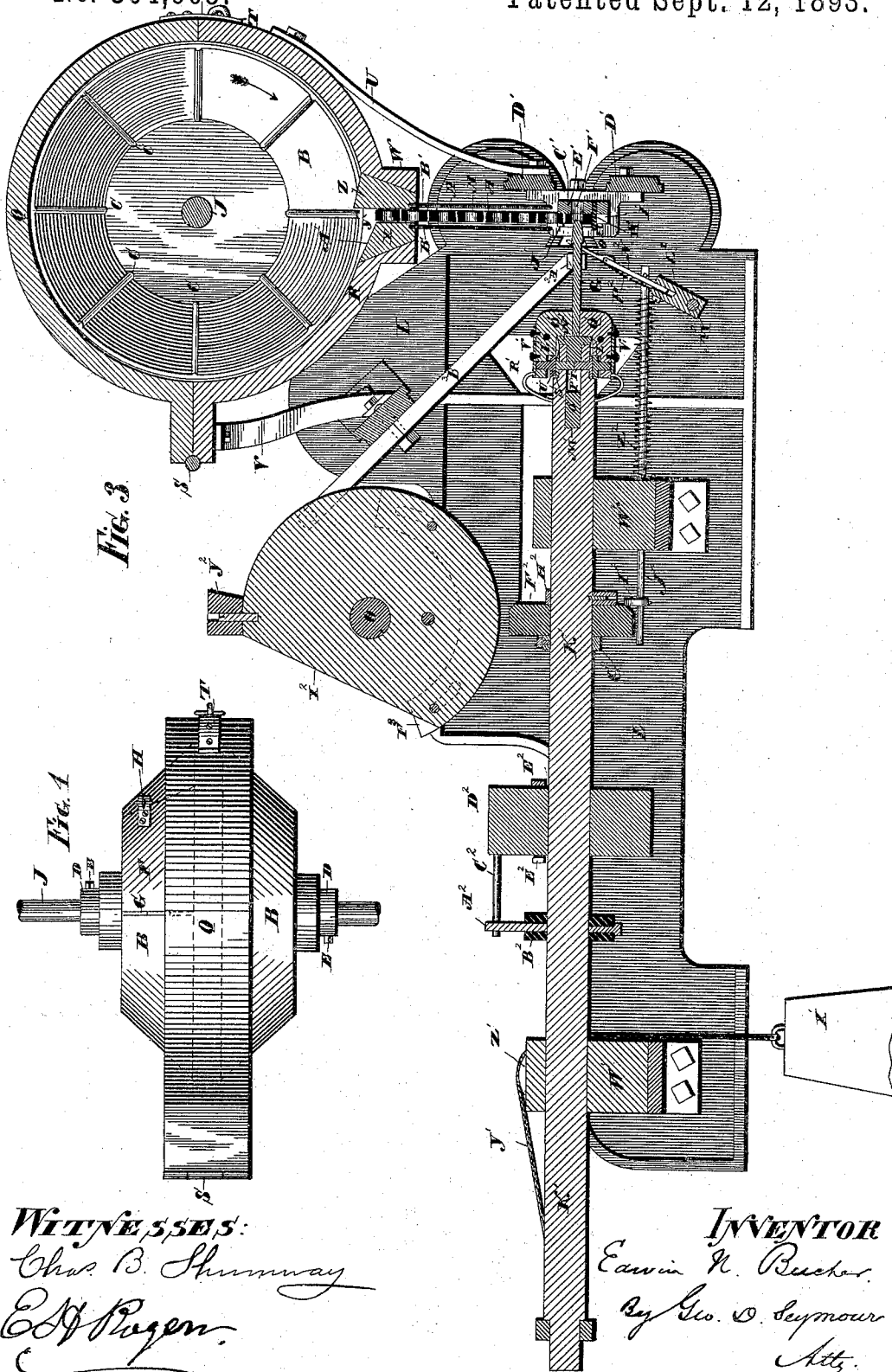
4 Sheets—Sheet 3.

E. N. BEECHER.

MACHINE FOR TAPPING OR REAMING BLANKS.

No. 504,903.

Patented Sept. 12, 1893.



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4 Sheets—Sheet 4.

E. N. BEECHER.

MACHINE FOR TAPPING OR REAMING BLANKS.

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Patented Sept. 12, 1893.

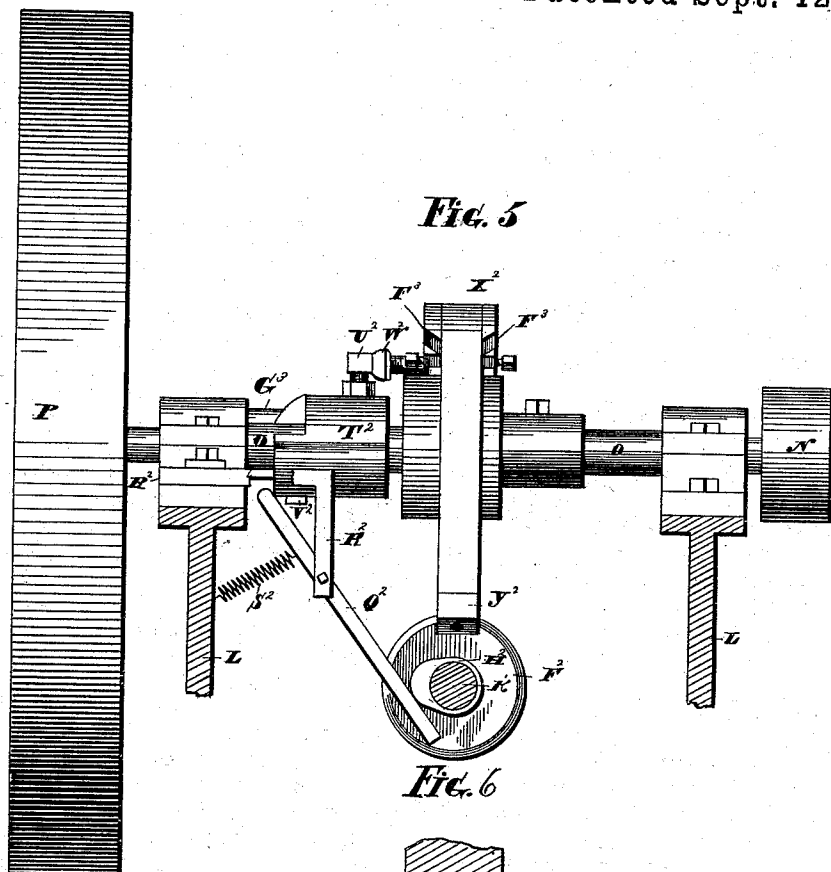
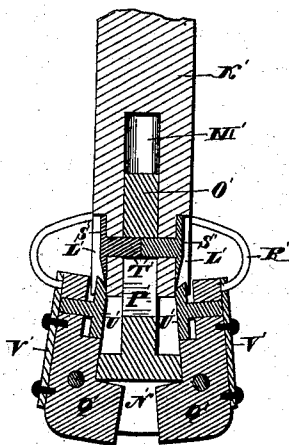


Fig. 5

Fig. 6



WITNESSES

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UNITED STATES PATENT OFFICE.

EDWIN N. BEECHER, OF MARION, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO HENRY H. CLARK, CHARLES H. CLARK, ROBERT W. BEMIS, AND WILLIAM H. CUMMINGS, OF SOUTHTON, CONNECTICUT.

MACHINE FOR TAPPING OR REAMING BLANKS.

SPECIFICATION forming part of Letters Patent No. 504,903, dated September 12, 1893.

Application filed December 13, 1886. Serial No. 221,347. (No model.)

To all whom it may concern:

Be it known that I, EDWIN N. BEECHER, residing at Marion, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Machines for Tapping or Reaming Blanks; and I do declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to an improvement in that class of automatic machines for tapping or reaming nut or other blanks, in which the cutting-tool is detached from its driving-shaft and the work discharged over its butt end, the object being to provide a machine of this description combining positiveness and reliability of action and durability and general efficiency in use, with a large capacity for work, and a wide range of adjustment.

With these ends in view, my invention consists in certain details of construction and combinations of parts as will be hereinafter described and pointed out in the claims.

In the accompanying drawings, Figure 1 is a plan view of one form which my improved machine may assume, with the feeding mechanism removed and the parts in their respective positions when the cutting-tool is detached for the removal of a blank over its butt end. Fig. 2 is a view in elevation from one side of the machine. Fig. 3 is a view of the machine in central longitudinal section, with the parts in position for beginning the cutting of a blank. Fig. 4 is a detached plan view of the blank-receiver. Fig. 5 is a detached view of the driving-shaft and the mechanism for coupling the cam-disk therewith and Fig. 6 is a view in section of the forward end of the tool-shaft and the tool-holding mechanism.

As herein shown the machine is set up for tapping nut-blanks. It is perfectly adapted, however, for reaming such blanks or for tapping or for reaming any similar blanks.

The nut-blanks A, are fed in bulk into a receiver, consisting in part of two pans B B, each provided upon its inner face with radial ribs C for agitating the blanks, and upon its outer face with a collar D, carrying a set-screw E, as shown. One of the pans is also provided in its periphery with a door F, hav-

ing a hinge G, and a fastening H, through which the blanks A, are introduced into the chamber formed between the pans. The said pans are mounted with a space between their edges corresponding to the greatest diameter of the blanks which pass through it in that dimension, upon a horizontal shaft J, having bearing in arms K K attached to the frame of the machine, and driven through a pulley mounted upon one of its ends, and belted to a similar pulley N, secured to the driving-shaft O, which is provided at its opposite end with a driving-wheel P, connected with any convenient source of power. The space between the pans is gaged to the blanks by the adjustment of the pans toward or away from each other upon the shaft J, aforesaid. A fixed guard composed of the sections Q and R hinged together as at S, provided with a fastening T, and supported by arms U and V, centrally incloses the said pans and prevents the escape of the blanks through the space between the adjacent edges of the same except at the lowest point of the lower section R, which is provided with an extension W. A chute-block X located in the said extension W is provided with a vertical opening Y, adapted in its dimensions for the edgewise passage of the blanks through it, with a beveled shoulder Z, extending upward into the chamber formed by the pans, and with an inclined table A', onto which the blanks fall from the said chamber, and by which they are rightly deflected into the said opening.

Wires B', driven into the lower face of the block at points adjacent to the opening therein, form a vertical cage conducting the blanks to the blank-holder. This latter consists in part of two upright blocks C' C', secured to two horizontal cross-pieces D' D', of the frame of the machine, and of a horizontal rest E', supported by the said blocks in an edgewise position, and having the blanks pressed against it in being cut, and provided with a horizontal perforation F' into which the tap G', passes, while and after going through the blank, and with a pin H', supporting the whole column of blanks in the cage. The said blank-holder also comprises two slides I' I', mounted in the blocks C' C', holding the blank in the holder against lateral edgewise

displacement, and horizontally slid by hand to conform to the gage of the blanks, and a guard J' arranged to prevent the blank next above that in the blank-holder from being laterally displaced by being pulled inward toward the tool-shaft, and thus prevented from feeding into the blank-holder, by the said blank in the tool-holder when it is withdrawn therefrom by the retraction of the tool-shaft.

As soon as a blank has been fed into the described holder, the tap G' advances to do its work. The said tap is alternately carried by and detached from a horizontal tool-shaft K', the forward end of which is provided at opposite points with slots L' L', and with a circular chamber M', as shown. A head N', provided with a spindle O' having a slot P', and entering the circular chamber aforesaid, carries two pivotal jaws Q' Q', normally held open by a spring R', embracing their tails, which enter the slots L' L' and prevent the head from rotating independent of the shaft K'. Shoes S' S' having their forward ends inclined, and provided with short shanks T' T', are mounted in the forward end of the shaft, being located in the bottom of the slots therein, with their shanks entering the slot P' in the spindle O' aforesaid. These shoes co-operate with similar shoes U' U' located in the tails of the jaws, and plates V' V' adjustably secured to the outer faces of the tails of the jaws and engaging with the shanks of the shoes U' U', are loosened or tightened to give such shoes more or less play, whereby the pinching action of the jaws is regulated. The said shaft is mounted in two bearings W' W', and moved forward to carry its tool to and through the blank in the holder by weights X' X', attached to cables Y' Y', running over pulleys Z' Z', and connected with the opposite ends of a cross-bar I, secured to the shaft. When in the forward movement of the shaft, the tap has reached the blank, a pin A² carried by an adjustable collar B², mounted upon the shaft, engages with a pin C², carried by a pulley D², loosely mounted upon the shaft, prevented from longitudinal movement thereon by arms E² E², and driven from any convenient source of power, the shaft being moved back and forth through it, and coupled with and uncoupled from it through the said pins. The shaft is provided at a point forward of the said loose pulley with a collar F², located between an adjustable collar G², and an adjustable cam H², the latter being situated in front of it.

In the forward movement of the tool-shaft, the collar F² engages with an adjustable block I², located upon a small horizontal rod J², mounted in the forward bearing W', of the tool-shaft, and connected at its forward end with arms K² K², secured to a slotted holder L², rigidly secured to a rocking-shaft M², mounted in the frame of the machine. The said slotted-holder L², carries a jointed blank-remover, composed of a stock N², a finger O², and a spring P², and laterally and longitudi-

nally adjustable in the holder as shown. As the rod J² is moved forward, the outer end of the said finger O², engages with the inner face of the blank in the blank-holder. The said rod continuing its said movement, the spring P² yields and the finger which is still engaged with the blank, is turned back on its hinge, until its outer end is sufficiently depressed to pass under the lower edge of the blank, after which its spring at once recovers it, lifting it up in front of the outer face of the blank preparatory to the removal of the same over the butt end of the tap G', as will be described later on. After the tap has passed through the blank, it continues on through the perforation F'. In this forward movement of the tool-shaft, its cam H² engages with a lever Q², pivoted to an arm R², connected with the frame of the machine, and held in a position of readiness to be engaged by such cam, by a spring S², as shown. The upper end of this lever is shaped to engage with a sleeve T², keyed to the shaft O, with a capacity for longitudinal movement thereon, and provided with an adjustable coupling-head U², and with a wedge V². When the said lever is operated by the cam H², it moves the sleeve J², so as to engage the head U² thereof with a similar head W², projecting from the adjacent side of the cam-disk X², which is loosely mounted upon the main-shaft O. The sleeve T² is cut away at its outer end as shown by Fig. 5 of the drawings, so that when the wedge J before mentioned is in line with the shipping-arm G³, the lever Q² can strike into such cut away portion or recess, and so not move the sleeve. The said main shaft and cam-disk having been coupled together, the latter is rotated to engage the finger Y² carried upon its periphery with the loose collar F², and begins to retract the tool-shaft. The first of this movement pulls the tap back and hence the blank just cut, out of the blank-holder, leaving the finger of the blank-remover in front of the said blank. A spiral-spring Z, encircling the rod J² and connected with its forward end and the adjacent bearing W', now turns the shaft M², and retracts the blank-remover with a quick movement, in which the same being in front of the blank upon the tap, moves such blank toward the butt-end of the same, and past the tool-holding jaws A³ A³, the function of which is to hold the tap during the time that the same is disconnected from the tool-holder carried at the forward end of the tool-shaft, and already described. The said jaws A³ A³ extend toward each other, and are respectively carried by the lower ends of two of the arms or levers B³ B³, which are fulcrumed upon the cross-piece C³. Springs D³ D³ respectively attached to the lower ends of the arms B³ B³, have the two-fold office of normally holding the jaws A³ A³ at the lower ends thereof, apart, and so as to clear the tap G', and of keeping the screws E³ E³ located in the upper ends of the jaws, normally in position to be en-

gaged, respectively, by the adjustable wedge faces $F^3 F^3$ located upon the respective sides of the cam-disk. Just as soon as the blank upon the tap has been moved back past the jaws $A^3 A^3$, the cams $F^3 F^3$ enter between the screws $E^3 E^3$, and separate the upper ends of the arms $B^3 B^3$, causing the said jaws to close upon the tap, which was stopped in its rotation before this occurs, by the uncoupling of the pins A^2 and C^2 before referred to. The tool-shaft continuing to retire under the action of the finger Y^2 and the jaws $Q' Q'$ being tightly clamped upon the tap, the shoes $S' S'$ are pulled from under the shoes $U' U'$, whereupon the spring R' forces the tails of the jaws into the slots $L' L'$, separating the outer ends of the jaws, and releasing the tap. The shaft and heads now retire together, leaving the tap held by the jaws $A^3 A^3$, and its butt end free for the discharge over it of the finished blank by the blank-remover. The finger on the periphery of the cam-disk now leaves the collar F^2 on the tool-shaft, which is at once carried forward by the weights $X' X'$. In this forward movement of the shaft, the head N' is engaged with the butt end of the tap which is held by the jaws $A^3 A^3$ and stopped while the shaft, under the action of the weights, moves forward, pushing its shoes $S' S'$ under the shoes $U' U'$ of the jaws, which are thus closed down upon the tap. The cams on the cam-disk now pass from between the screws $E^3 E^3$, and allow the springs $D^3 D^3$ to move the levers $B^3 B^3$ and the jaws $A^3 A^3$, the latter releasing the tap, which is now rotated again by the re-engagement of the pins A^2 and C^2 . The wedge V^2 on the sleeve T^2 is now engaged by a shipping-arm G^3 , which moves the sleeve to uncouple the heads U^2 and W^2 , leaving the cam-disk loose upon the main-shaft, the disk being weighted so as to turn of itself into position for being recoupled again when the sleeve is moved toward it. The tool-shaft is meanwhile started in rotation again by the re-engagement of the pins A^2 and C^2 , and moved forward to tap another blank which has gravitated into the blank holder.

It is to be noted that although the time required for the cutting-tool to do its work upon the blanks may vary, the action of the machine is not affected, inasmuch as the mechanism for coupling the cam-disk which retracts the tool-shaft, with the driving-shaft, is not set into operation until the tool-shaft has reached the limit of its forward stroke. Here the coupling mechanism has a safety function, and prevents accident to the machine, exercising the same function also when the tool refuses to go through the blank at all. It is to be noted also, that the parts of the machine being adjustable throughout, may be conformed to a wide range of work, and timed to do it to the best advantage.

I would have it understood that I do not limit myself to the exact construction and combination of parts herein shown and de-

scribed, but hold myself at liberty to make such alterations and changes as fairly fall within the spirit and scope of my invention. 7c

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a machine for tapping or reaming blanks, the combination with a rotary, reciprocatory tool-driving shaft, provided with a flange or collar; of a rotary cam normally uncoupled from its shaft and engaging when coupled therewith and actuated, with the said flange or collar and sliding the tool-driving shaft in one direction; means for sliding such shaft in the opposite direction, a tool, and a blank-holder for holding the blank while it is being tapped or reamed, substantially as set forth. 85

2. In a machine for tapping or reaming blanks, the combination with a rotary, reciprocatory tool-driving shaft provided with a flange or collar; of a rotary cam engaging with the said flange or collar to slide the said shaft in one direction, means for sliding the shaft in the opposite direction, and a driving-pulley loosely mounted on the tool-driving-shaft and coupled with and uncoupled from the same, substantially as set forth. 95

3. In a machine for tapping or reaming blanks, the combination with a rotary, reciprocatory tool-driving shaft, provided with a flange or collar; of a tool-holder carried by the said shaft and normally holding the tool, jaws for holding the tool by its shank while the blank is being removed from it, a cam to engage with the said flange or collar to retract the shaft after it has done its work, and also adapted to operate the said jaws in gripping the tool, and means for sliding the shaft in the opposite direction and for intermittently rotating it, substantially as described. 105

4. In a machine for tapping or reaming blanks, the combination with a rotary, reciprocatory tool-driving shaft, of a tool-holder carried at the forward end of the same and normally holding the tool, a secondary tool-holder for temporarily holding the tool when the blank is being removed from the same, a normally idle cam for operating the said secondary tool-holder, and mechanism connecting the said shaft and cam, whereby the longitudinal movement of the former is made to control the operation of the latter, substantially as described. 120

5. In a machine for tapping or reaming blanks, the combination with a rotary, reciprocatory tool-driving shaft; of a rotary cam normally uncoupled from its shaft and operating when coupled therewith to slide the tool-shaft in one direction, means for sliding the tool-shaft in the opposite direction, a detachable tool, a secondary tool-holder for holding the tool while the blank is being removed from the same, and a blank-holder, substantially as set forth. 130

6. In a machine for tapping or reaming blanks, the combination with a rotary, recip-

rocatory tool-driving shaft, of a tool-holder carried thereby, a detachable tool, a secondary tool-holder for holding the tool while the blank is being removed from it, a cam normally uncoupled from its shaft and operating, when coupled therewith, the said secondary tool-holder, and a blank-remover, substantially as set forth.

7. In a machine for tapping or reaming blanks, the combination with a tool-shaft, means for rotating and reciprocating the same, and a tool-holder comprising a head so articulated to one end of the shaft as to permit independent longitudinal movement between them, tap-holding jaws pivoted to such head, and means interposed between the jaws and shaft for operating the jaws when the head and shaft are relatively moved longitudinally, substantially as described.

8. In a machine for tapping or reaming blanks, the combination with a tool-driving shaft, means for rotating and reciprocating the same, and a tool-holder comprising a head, tap-holding jaws pivoted thereto, shoes between the tails of the said jaws and the end of the shaft, and a spring to open the jaws, the said head being so articulated to one end of the shaft as to permit independent longitudinal movement between them, and one or more of the said parts being constructed with bevels or inclines so that when such movement takes place, the jaws will be operated, substantially as described.

9. In a machine for tapping or reaming blanks, the combination with a tool-driving shaft having a longitudinal chamber entering it from its forward end, means for rotating and reciprocating the said shaft, and a tool-holder comprising a head having a spindle which enters the chamber in the shaft so as to have longitudinal movement therein, tool-holding jaws pivoted to the said head, cam-shoes interposed between the tails of the jaws and the shaft, and a spring arranged to open the said jaws, substantially as described, and whereby the said tool-holder and shaft are articulated for independent longitudinal movement which is utilized in operating the said jaws.

10. In a machine for tapping or reaming blanks, the combination with a tool-driving shaft having a longitudinal chamber entering it from its forward end, and slots formed in its exterior surface, and extending parallel with the said chamber, a head having a spindle which enters the said chamber and is movable therein, tool-holding jaws pivoted to the said head, and constructed with tails which enter the slots in the shaft, means located in the slots for operating the jaws in one direction, and a spring to impart opposite movement to the jaws, substantially as described, the said head, jaws, shoes, means and spring forming a tool-holder which is so articulated to the shaft that the said holder and shaft may have independent longitudinal movement.

11. In a machine for tapping or reaming blanks, the combination with a rotary, reciprocatory tool-driving shaft having slots and a chamber in its outer end; of a head having a slotted spindle entering such chamber in the shaft, tool-holding jaws pivoted to such head and entering such slots, shoes for closing the said jaws, a spring for opening the jaws, a tool, and a blank-holder, substantially as set forth.

12. In a machine for tapping or reaming blanks, the combination with a rotary, reciprocatory tool-driving shaft, a tool-holder carried by the said shaft at the forward end thereof and normally holding the tool, a secondary tool-holder to hold the tool when the same is disconnected from the other tool-holder, a blank-holder, a blank-remover, connection between the said shaft and blank-remover including a collar mounted on the shaft, and a spring-actuated rod connected with the blank-remover and moved in one direction by the said shaft by means of the said collar and in the opposite direction by its said spring, substantially as described.

13. In a machine for tapping or reaming blanks, the combination with a rotary, reciprocatory tool-driving shaft; of a tool-holder carried thereby, a detachable tool, a secondary tool-holder, and a blank-remover having a hinged finger arranged to yield to pass from one face of the blank to the other and recover for removing it from the tool, substantially as set forth.

14. In a machine for tapping or reaming blanks, the combination with a rotary reciprocatory shaft, of a tool-holder carried thereby, a tool, a blank remover, a collar upon the shaft, and a rod engaged by such collar and connected with the blank-remover, substantially as set forth.

15. In a machine for tapping or reaming blanks, the combination with a rotary, reciprocatory tool-driving shaft; of a primary and a secondary tool-holder, and a blank-remover consisting of a pivoted block, a stock adjustably mounted therein, a finger hinged to the stock, and a spring for holding such finger normally extended, substantially as set forth.

16. In a machine for tapping or reaming blanks, the combination with a tool-driving shaft, of a tool-holder carried thereby and normally holding the tool, means for rotating the shaft, a cam for sliding the shaft in one direction, means for sliding the shaft in the opposite direction, means substantially as described for controlling the action of the said cam, a secondary tool-holder, a blank-holder and a blank-remover, substantially as described, and whereby the cam which slides the shaft in one direction is put into and out of operation by the sliding movement of the shaft independent of the number of revolutions thereof.

17. In a machine for tapping or reaming blanks, the combination with a rotary, reciprocatory tool-driving shaft; of a tool-holder

carried thereby, a tool, a lever operated by a cam on the said tool-driving shaft, and a driving-shaft provided with a movable sleeve and a loosely mounted cam, the said lever being controlled by the tool-driving shaft in moving the sleeve to couple the loose cam with the driving-shaft, substantially as set forth.

18. In a machine for tapping or reaming blanks, the combination with a rotary, reciprocatory tool-driving shaft; of a driving-shaft normally rotating independent of the tool-driving shaft, and normally uncoupled cam and lever mechanism controlled by the sliding tool-driving shaft in coupling the same with the driving-shaft, substantially as set forth.

19. In a machine for tapping or reaming blanks, the combination with a tool-driving shaft, a tool-holder carried thereby for normally holding the tool, means for rotating the said shaft and for sliding it in one direction, a driving shaft, a cam-disk loosely mounted thereupon, and constructed and arranged to move the tool-driving shaft in the opposite direction when it is coupled with the said driving shaft and rotated thereby, coupling mechanism for coupling the said disk and driving shaft, and connection between the said mechanism and tool driving-shaft, brought into play by the forward movement of the latter, substantially as described, and whereby the tool driving-shaft in its sliding movement controls the actuation of the said disk by effecting the coupling of the same with the driving shaft on which the same is mounted.

20. In a mechanism for tapping or reaming blanks, the combination with a tool-driving shaft, a tool-holder carried thereby for normally holding the tool, a secondary tool-holder, means for intermittently rotating the said tool driving shaft, and for sliding it in one direction, a driving-shaft, a cam-disk loosely mounted thereupon and having its opposite faces provided with cams to operate the said secondary tool-holder, and having its edge adapted to move the said tool-driving shaft in the opposite direction, coupling mechanism for coupling the said disk with the driving shaft, and connection between the said mechanism and the tool driving-shaft, brought into play by the forward movement of the latter, substantially as described.

21. In a machine for tapping or reaming blanks, the combination with a tool-driving shaft, a tool-holder carried thereby, a tool, a driving-shaft, a cam loosely mounted thereon and coupled intermittently therewith for operating the tool-driving shaft, coupling mechanism controlled by the tool-driving shaft for coupling the cam with the driving-shaft, a secondary tool-holder for holding the tool when detached from the tool-driving shaft, and a blank-holder, substantially as set forth.

22. In a machine for tapping or reaming blanks, the combination with two blank-receiving pans set with a sufficient space between their edges for the edgewise passage

of the blanks, means for rotating the said pans together, a fixed guard encircling their edges to close the said space, and having in its lower edge a passage for the escape of the blanks, and provided with a beveled shoulder extending upward between the said pans into the space inclosed by them, and with an inclined table located on the opposite side of the said passage from the said shoulder and below the level of the same, and a chute leading from the said passage, substantially as described.

23. In a machine for tapping or reaming blanks, the combination with two blank-receiving pans set with a sufficient space between their edges for the edgewise passage of the blanks between them, means for rotating the said pans together, a fixed guard encircling their edges and composed of two sections hinged together, the lower section having an opening in it, a chute-block located in the said opening, and constructed at its upper edge to form a beveled shoulder, which extends upward between the said pans, with a beveled table located below such shoulder, and with a passage located between such shoulder and table; and a chute leading from the said passage through which the blanks issue into the chute, substantially as described.

24. In a machine for tapping or reaming blanks, the combination with a tool-driving shaft, a tool-holder carried thereby for normally holding the tool, a secondary tool-holder for holding the tool when detached from the said tool-driving shaft, means for sliding the said shaft forward; means for intermittently rotating the shaft, put into action by its forward movement, and out of action by its retraction; mechanism for sliding the shaft back or retracting it, including a driving shaft and a cam loosely mounted thereon, and clutch-mechanism between the said driving shaft and the said cam, and connection between the said mechanism and the tool driving shaft, operated by the latter, and including a shipping lever, substantially as described, and whereby the said cam is coupled with the driving shaft for retracting the tool-driving shaft by the forward longitudinal movement thereof independent of the number of its rotations.

25. In a machine for tapping or reaming blanks, the combination with a rotary, reciprocatory tool-driving shaft, a tool-holder carried thereby for normally holding the tool, a secondary tool-holder for holding the tool while it is disconnected from the other tool-holder, a blank-remover for removing the blanks over the butt-end of the tool, and means controlled by the said shaft independent of the number of its revolutions, for retracting it, and including a driving shaft, a cam loosely mounted thereupon, a collar mounted on the tool-driving shaft, a clutch for coupling the said cam to the driving-shaft, and a shipping-lever attached by the said collar for operating the said clutch, substantially as described.

26. In a machine for tapping or reaming blanks, the combination with a rotary, reciprocatory tool-driving shaft, of a tool-holder carried thereby for normally holding the tool, a secondary tool-holder, mechanism for sliding the shaft forward, means for intermittently rotating the shaft, put into and out of action respectively by its forward and rearward movement, a driving shaft, a cam loosely mounted thereupon, and constructed and adapted to operate the secondary tool-holder and to move the tool driving-shaft rearward, coupling-mechanism for coupling the said cam to the said driving shaft, and operating connections between the tool driving-shaft and said mechanism, substantially as described, and whereby the retraction of the tool driving shaft is made to depend upon the extent of its forward movement and not upon the number of its revolutions.

27. In a machine for tapping or reaming blanks, the combination with a rotary and reciprocatory tool driving shaft, of a tool-holder carried thereby, a cam normally uncoupled from its shaft and operating when coupled therewith to retract the tool-driving shaft, means for advancing the tool-driving shaft, and mechanism operated by the said tool-driving shaft in its forward movement and independent of the number of its rotations for controlling the actuations of such cam, substantially as described.

28. In a machine for tapping or reaming blanks, the combination with a rotary and reciprocatory tool driving shaft, of a tool-holder carried thereby, a tool, a secondary tool-holder for holding the tool when detached from the said shaft, a normally idle cam actuating the said secondary tool-holder, and a clutch operated by the tool-driving shaft in its forward movements, and independent of the number of its rotations for controlling the actuation of such cam, substantially as set forth.

29. In a machine for tapping or reaming blanks, the combination with a rotary, reciprocatory tool-driving shaft, of a cam normally uncoupled from its shaft for sliding the tool-driving shaft in one direction, means for sliding such shaft in the opposite direction, a detachable tool-holder carried by such shaft, and a secondary tool-holder operated by such cam to hold the tool while the blank is being removed from the same, and mechanism controlled by the said tool-driving shaft for causing the actuation of the said cam, substantially as set forth.

30. In a machine for tapping or reaming blanks, the combination with a rotary reciprocatory tool-driving shaft; of a cam normally uncoupled from its shaft and operating when

coupled therewith to slide the tool-driving shaft, means for sliding the said tool-driving shaft in the opposite direction, and mechanism controlled by the tool-driving shaft for causing the actuation of the cam, substantially as set forth.

31. In a machine for tapping or reaming blanks, the combination with a rotary reciprocatory tool-driving shaft, of a tool-holder carried thereby for normally holding the tool, a secondary tool-holder, mechanism for sliding the said shaft forward, means for rotating the shaft brought into and put out of operation by its sliding movement, and means for retracting the shaft, and constructed to operate independent of the number of its revolutions when the same has reached the limit of its forward movement, and including a driving shaft, a cam loosely mounted thereupon, a clutch for coupling the said driving shaft and cam together, a lever for operating the said clutch and a collar mounted on the tool-driving shaft for actuating the said lever, substantially as described.

32. In a machine for tapping or reaming blanks, the combination with a rotary, reciprocatory tool-driving shaft; of a tool-holder carried thereby, a cutting-tool, a secondary tool-holder for holding the tool while the same is detached from the shaft for the removal of the blank from it, a driving-shaft, a normally idle cam loosely mounted thereupon and arranged and adapted to operate the said tool-holder and mechanism substantially as described, controlled by the shaft independently of the number of its rotations for coupling the said cam with the said driving-shaft for operating such secondary tool-holder, substantially as set forth.

33. In a machine for tapping or reaming blanks, the combination with a rotary, reciprocatory tool-driving shaft, a tool-holder carried thereby, a secondary tool-holder, means for sliding the shaft forward, means for rotating the shaft put into action by the forward movement of the shaft, and out of action by its rearward movement, a collar mounted on the shaft and rotated therewith, mechanism for moving the shaft rearward, and devices connecting said mechanism and collar, whereby the same causes the said mechanism to operate in retracting the shaft, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

EDWIN N. BEECHER.

Witnesses:

THOMAS W. MOORE,
HENRY W. CLARK