No. 659,192. Patented Oct. 2, 1900.

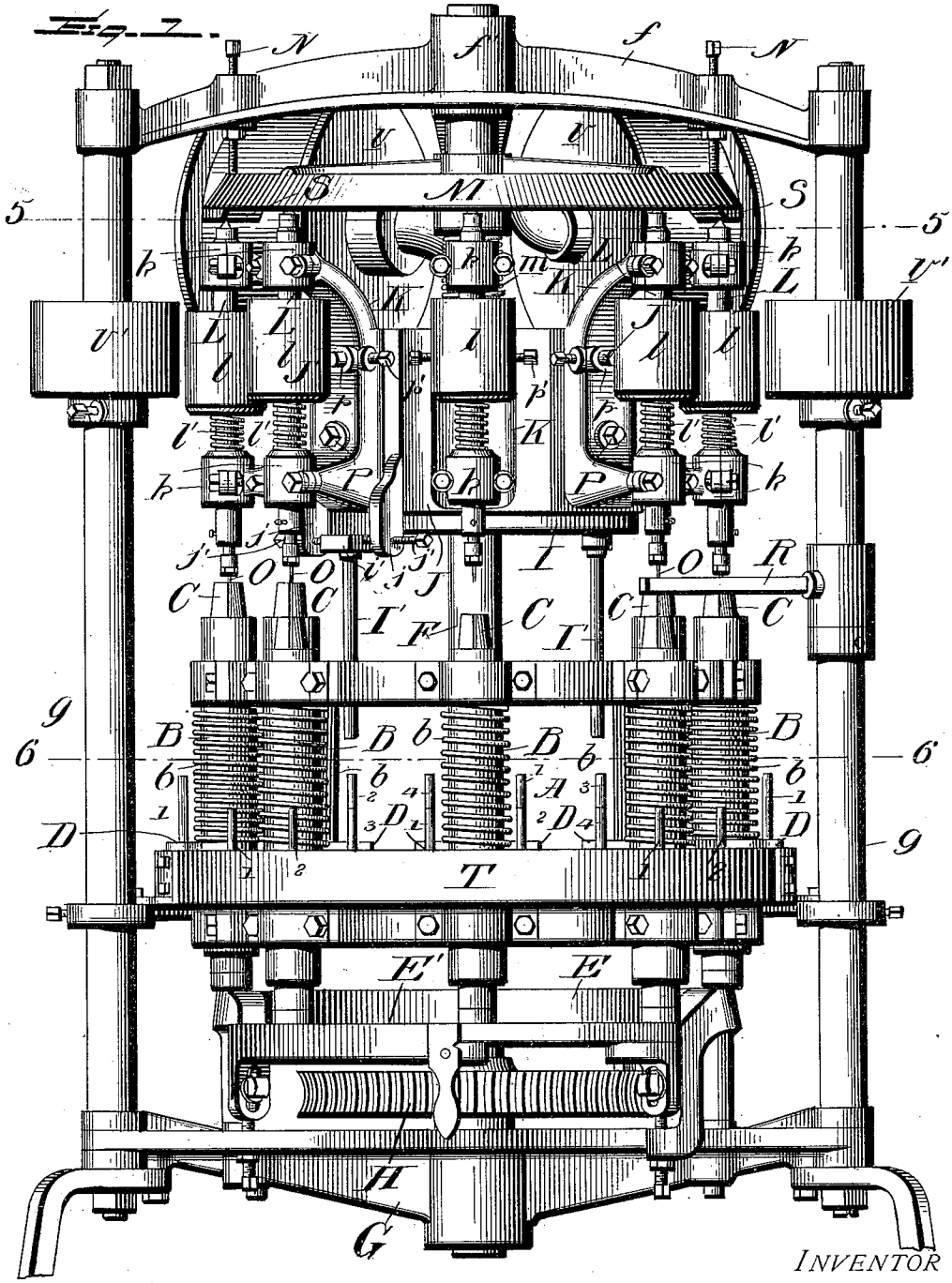
N. BARRY, JR.

BUTTON DRILLING MACHINE.

(Application filed Apr. 2, 1900.)

(No Model.) 6 Sheets—Sheet 1.

Fig. 1.



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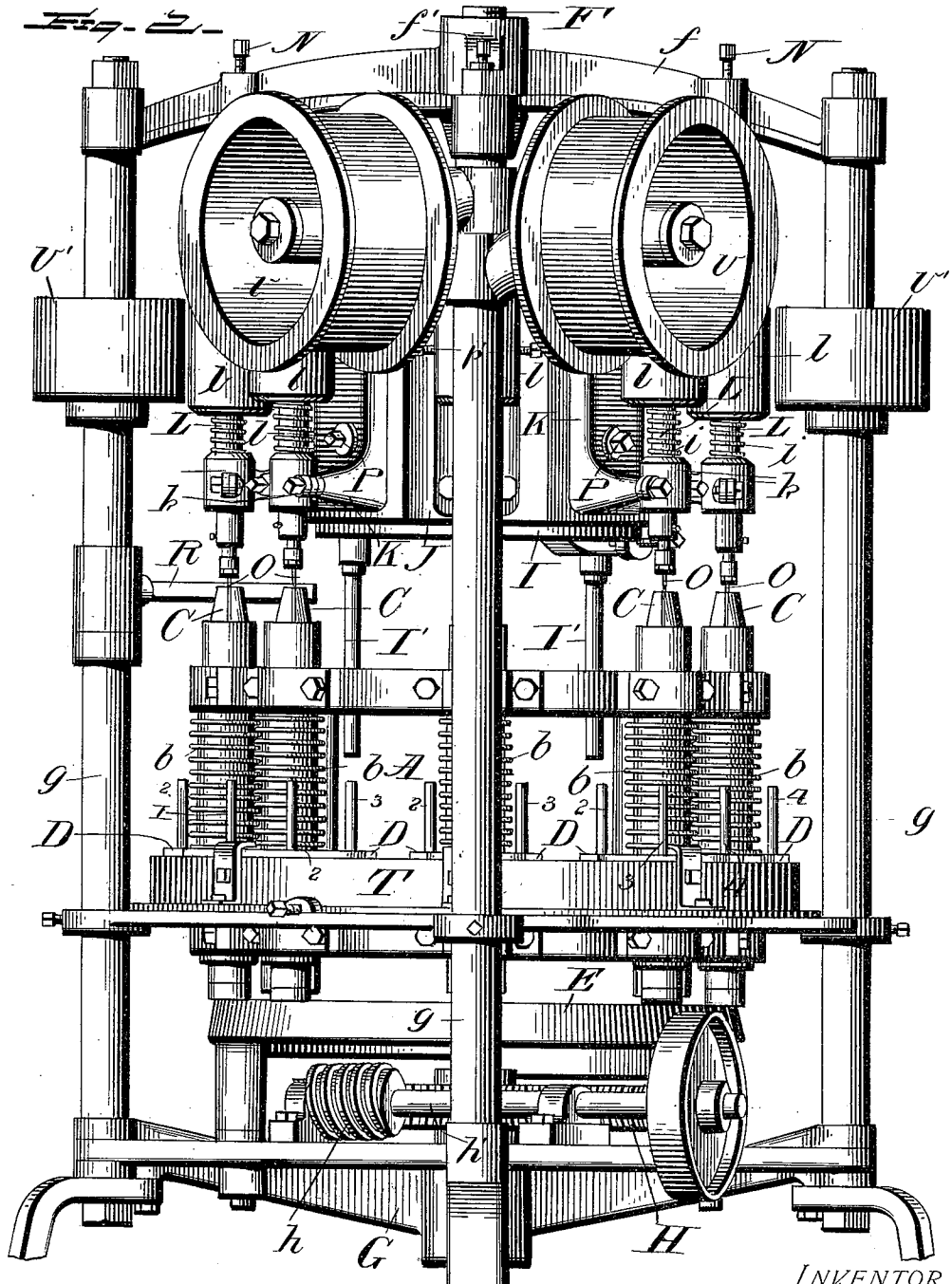
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(No Model.) 6 Sheets—Sheet 2.

Fig. 2.



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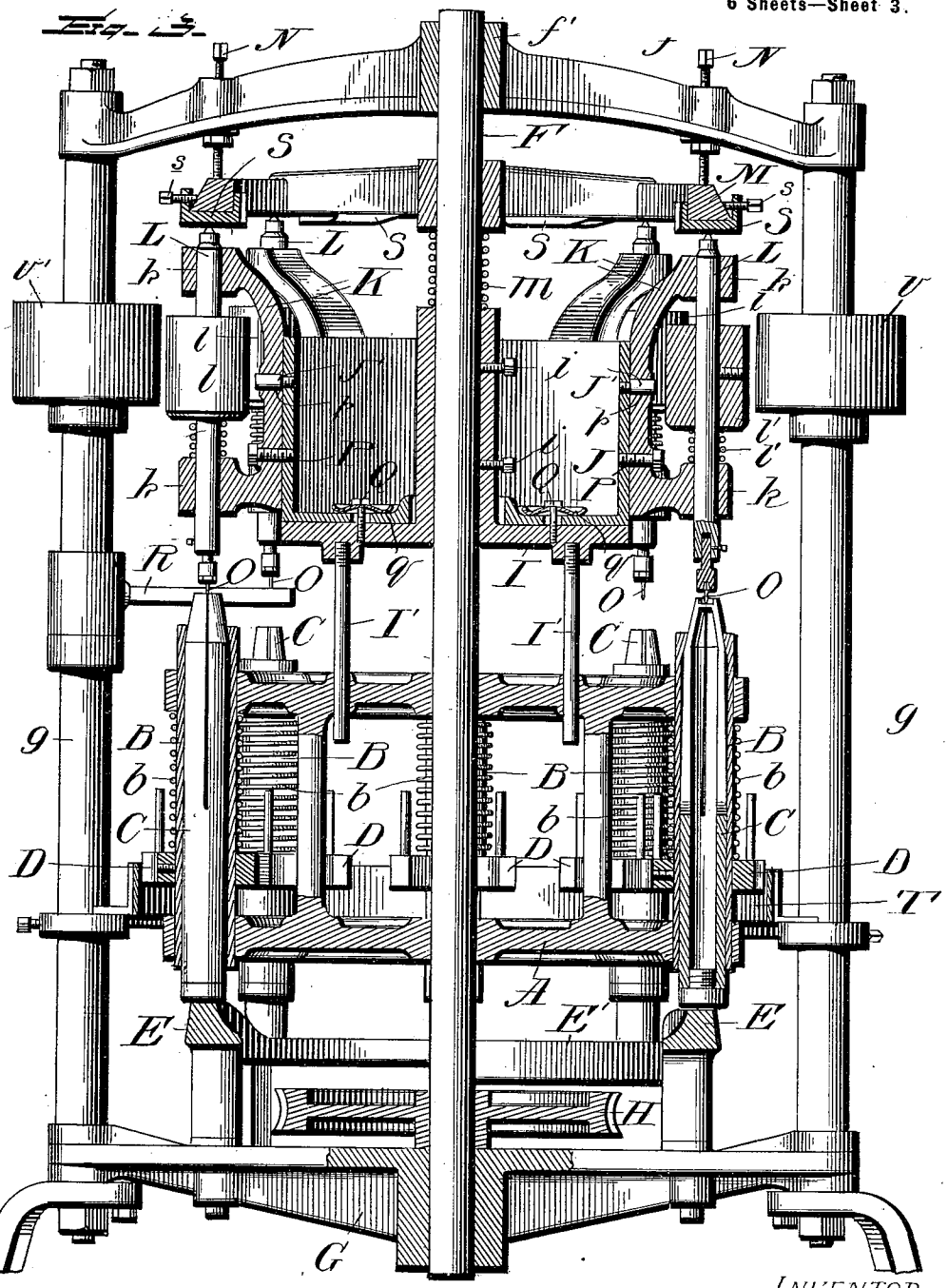
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(Application filed Apr. 2, 1900.)

(No Model.) 6 Sheets—Sheet 3.

Fig. 5.



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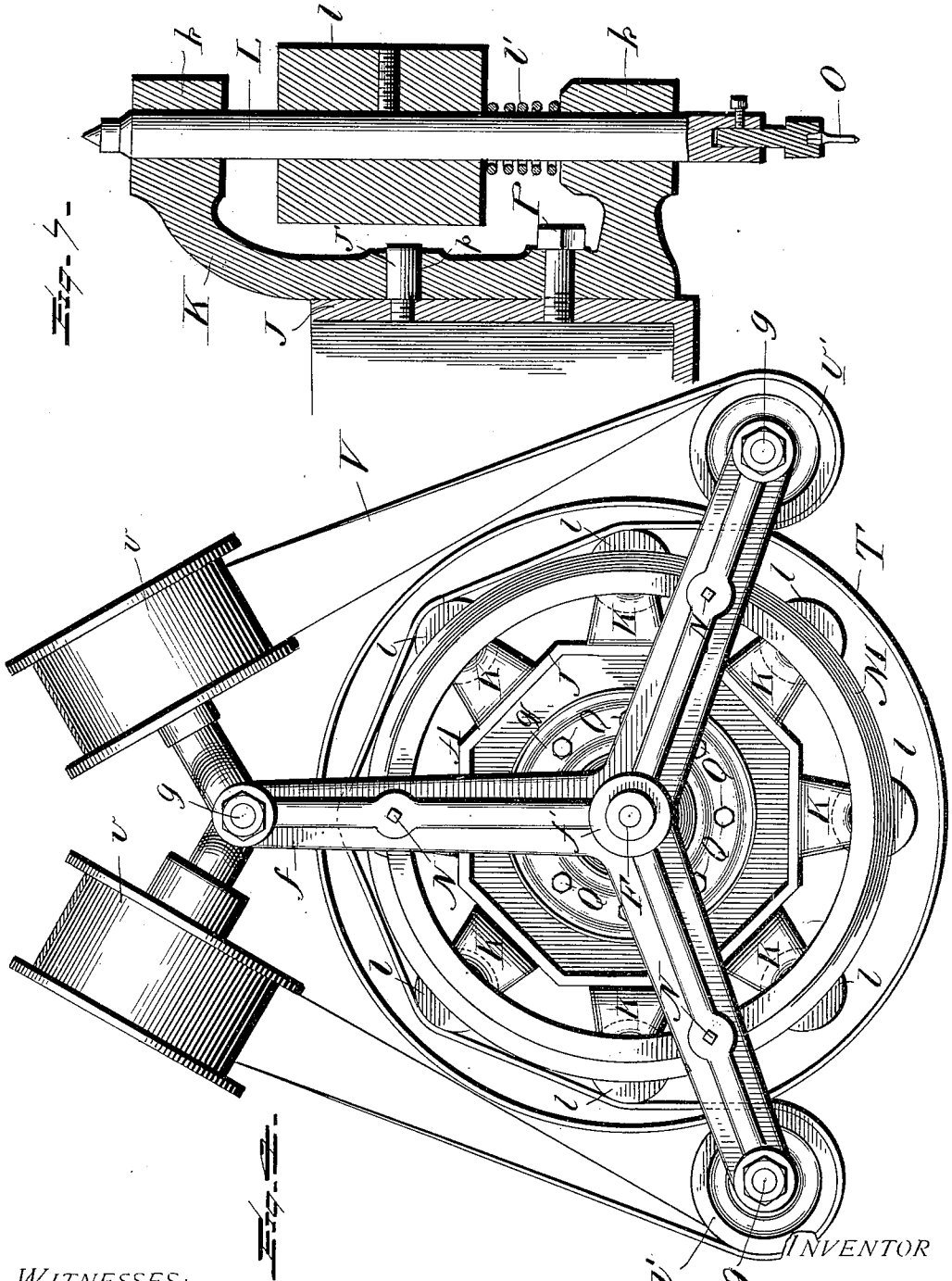


Fig. 4.

Fig. 5.

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BUTTON DRILLING MACHINE.

(Application filed Apr. 2, 1900.)

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Fig. 4.

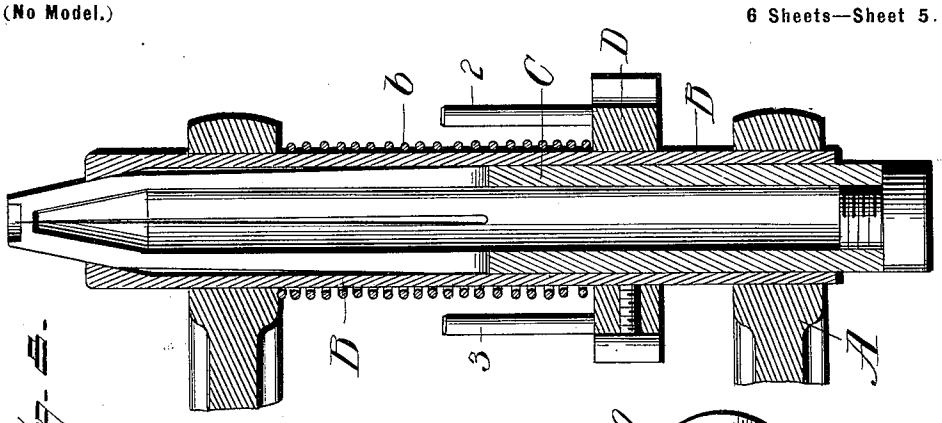
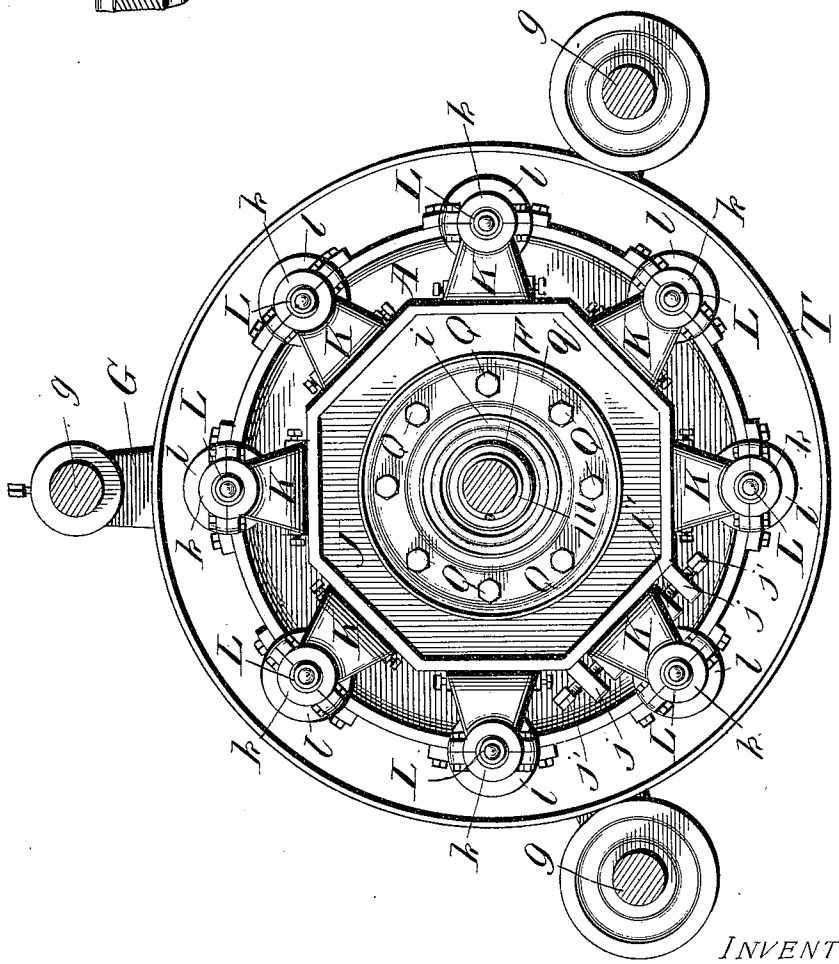


Fig. 5.



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(Application filed Apr. 2, 1900.)

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Fig. 5.

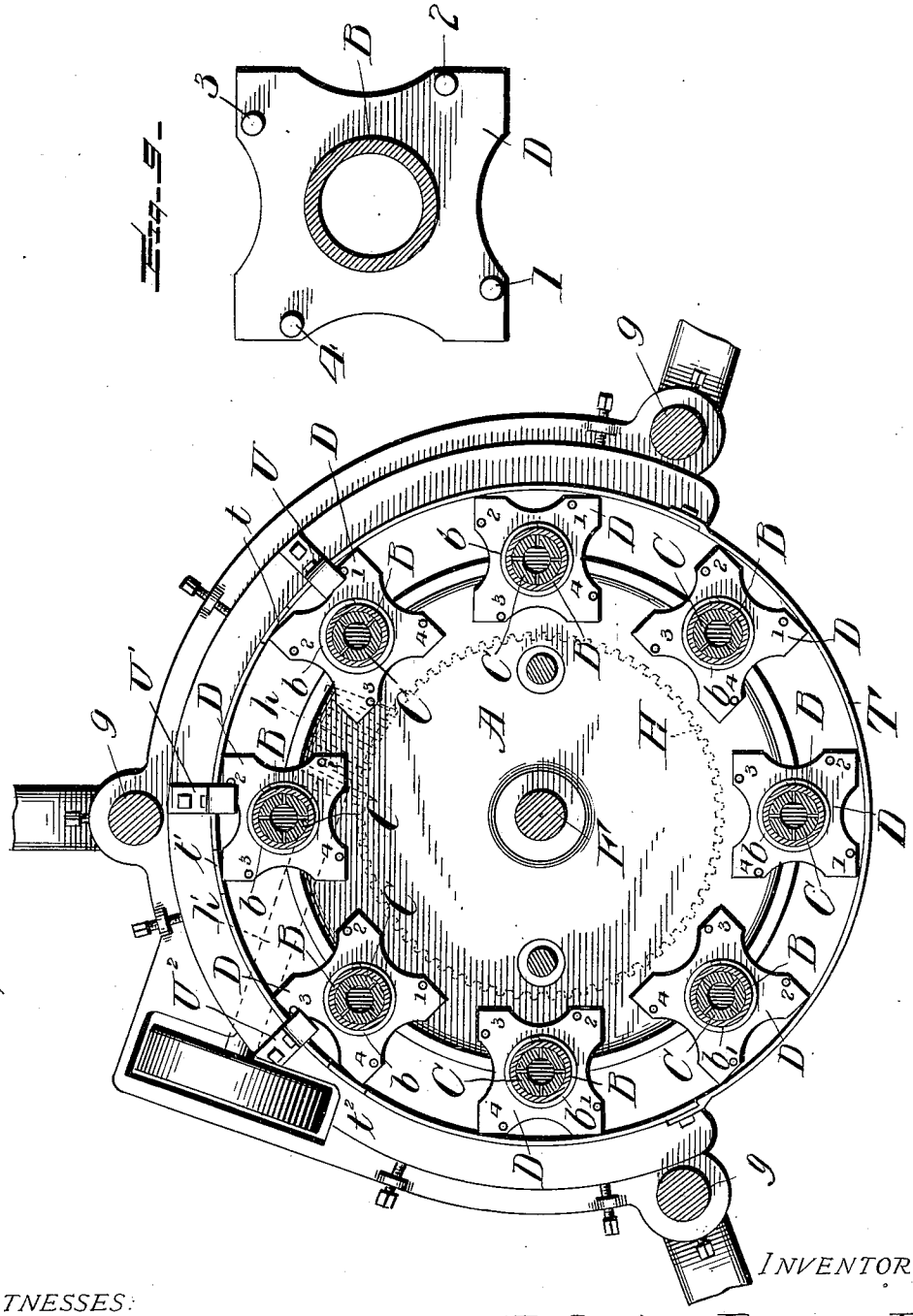


Fig. 5-5.

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UNITED STATES PATENT OFFICE.

NICHOLAS BARRY, JR., OF MUSCATINE, IOWA.

BUTTON-DRILLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 659,192, dated October 2, 1900.

Application filed April 2, 1900. Serial No 11,195. (No model.)

To all whom it may concern:

Be it known that I, NICHOLAS BARRY, Jr., of Muscatine, in the county of Muscatine and State of Iowa, have invented certain new and useful Improvements in Button-Drilling Machines; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

This invention is an improved machine for automatically drilling holes in pearl and bone buttons; and its object is to produce a machine wherein the most delicate buttons can be safely drilled automatically and wherein a number of buttons can be simultaneously operated upon, thereby increasing the capacity of the machine, each button-blank chuck or holder and its coacting drill traveling together, and means being provided whereby the relative positions of the drill and the button-blank will be automatically changed during their linear travel, so that the desired number of holes in the blank shall be drilled successively and at the proper points, and provision is further made whereby the number of drilling operations performed by each drill upon the blank may be varied and the time required for each drilling operation may also be regulated. Means are also provided for bringing the chucks or blank-holders into position to release the drilled blanks and to receive an unfinished one without necessitating the stopping of the machine, and thereafter the chuck presents and maintains the blank in proper position relative to the drill to undergo the drilling operations. Means are also provided whereby the drills can be set at an angle, so as to drill slanting holes in the blanks, if desired, and various adjustments are provided whereby wear on the parts can be taken up with the greatest nicety. I have also provided simple but effective means whereby the drills can be readily adjusted in the several drill-holders with absolute uniformity and without necessitating trying and fitting of the drills relative to the blank-holders to properly adjust them.

In the accompanying drawings I have illustrated a multiple drilling-machine which embodies the various features of my invention in the best form now known to me, and the principles of the invention can be readily understood from the following description of the said machine.

Referring to the drawings, Figure 1 is a front elevation of the machine. Fig. 2 is a rear elevation thereof. Fig. 3 is a vertical longitudinal section. Fig. 4 is a top plan view. Fig. 5 is a horizontal section on line 5 5, Fig. 1. Fig. 6 is a horizontal section on line 6 6, Fig. 1. Fig. 7 is an enlarged detail view of a drill-holder. Fig. 8 is an enlarged sectional view of one of the chucks. Fig. 9 is an enlarged detail of part D.

A designates a rotary chuck-holder, which consists of a pair of upper and lower disks suitably connected by stays or bolts and provided near their peripheries with openings for the reception of the spindles B, through which pass the chucks C, the chucks being split at their upper ends, as usual, and adapted to receive a button-blank. The spindles are supported on the lower disk and are pressed down by means of springs *b*, interposed between collars D on the lower end of the spindle and the upper disk, as shown. Preferably the upper end of the chuck C is conical and tapered to engage the correspondingly-interiorly-tapered upper end of the spindle B, so that when said chuck is raised it will bind in the spindle and lift the latter, and the spring-pressure will cause the closing of the chuck. The chucks extend through the spindles and depend below the holder A and are adapted to ride upon an annular cam or track E, which track is provided with a depressed portion E′ at one side, so as to permit the chucks to drop down through the spindle, and in this position the chucks will open and the drilled blank can be removed therefrom and an undrilled blank substituted, this portion E′ being long enough to enable the removal and feeding operations to be performed without stopping the machine.

The holder A is mounted upon a vertical shaft F, which is stepped in the central boss of a three-armed spider G, forming part of the base of the machine, and from the arms of this spider rise vertical shafts *g*, which are connected at the top by another spider *f*, hav-

ing a central hub f', in which the upper end of the shaft F is journaled. A worm-gear H is secured on the lower end of the shaft F and is operated by a worm h on a shaft h', which may be driven by any suitable means.

The parts thus far described are substantially similar in construction and operation to like parts shown in my Patent No. 643,587, dated February 13, 1900, and need not be further described herein, only in the present machine I have preferably employed springs b instead of weights to depress the spindles B.

Above the chuck-holder and attached to shaft F is a plate I, the hub of which is adjustably secured to shaft F by bolts i and is kept in correct alinement with the holder A by means of bolts or rods I', depending from the under side of the plate and passing through corresponding openings in the upper part of holder A, as shown. On this disk I is mounted a polygonally-faced drill-holder J, which, as shown, has eight faces corresponding to the number of chucks employed, and to each face of this drill-holder is attached a casting K, which is provided with upper and lower journals k for a vertically-movable drill-rod L, on which is secured a pulley l, below which is a spring l', which serves to press the pulley and drill-rod upward and into contact with the under side of an annulus M, which is loosely journaled on the shaft F and is pressed upward by a spring m, the vertical position of this annulus M above holder J being regulated by the adjustable bolts N, which are tapped through the arms of spider f and provided with locking-nuts, as shown.

The lower end of the drill-rods L are provided with usual drill-attaching devices by which the drills O may be secured thereto.

It will be observed that there is a drill provided for and opposite every chuck and adapted to coöperate therewith in the operation of the machine, and the drill and its related chuck travel together. By diminishing the number of these drills and chucks the capacity of the machine could be decreased and by increasing their number the capacity of the machine would be correspondingly increased.

I have found that eight pairs of drills and chucks constitute a very efficient working machine, which will require a rapid operator to feed it when working at its normal speed.

Each casting K is pivotally attached to the holder J by a bolt P and is provided above this bolt with an opening p, through which projects a stud J', attached to the holder J, and through the casting K at each side of the opening p are tapped adjusting-bolts p', which are adapted to engage opposite sides of pin J', and by means of these bolts the casting K and the drill-rod attached thereto can be swung on bolt P and be set at an angle to the corresponding chuck for the purpose of causing the drill to cut slanting holes in the blank, as is sometimes desired. Further, the holder J is provided with lugs j, which embrace a projection i' on plate I, and through these lugs j are tapped adjusting-bolts j', by which the drill-holder can be turned on the plate I sufficiently to move the drills slightly eccentric to the chucks, so that the drills will operate upon the blanks at one side of the center thereof and make the holes at the desired positions therein. A blank can be placed in one chuck and its drill adjusted to the proper eccentric position by shifting the drill-holder, as described, and when this one drill is set and the holder is locked all the drills will be set in like positions relative to their chucks, so that all the blanks will be correspondingly drilled. Thus the drills can all be adjusted alike simultaneously and in the most expeditious manner. The drill-holder J is held down on plate I by means of bolts Q, which are passed through enlarged holes in the bottom of the holder, which holes are covered by spring-washers q. The bolts and washers fasten the holder securely to the plate I, but at the same time do not prevent its adjustment thereon by bolts j', as above described. On one of the uprights g is journaled a horizontal arm R, which is used in setting the drills. When it is desired to put a new drill or set of drills in the machine, this arm is swung in under the drill-holder and the drills inserted in and fastened to the drill-rods while resting on this arm, of course only one drill being set at a time; but by this means the points of all the drills will be on the same horizontal plane, and as the blanks presented by the chucks are always held in the same plane during the drilling operations thereon all the drills will be moved the same distance into the chucks and through the buttons. By this means the drills are set accurately and not by guess, nor is it necessary to fit and try the relative adjustment of the drills. After the drills are set the arm R is swung to one side out of the way. The drills will be normally raised out of the way of the chucks and out of contact with the buttons therein by the uplifting-springs l', and in order to cause the drills to operate upon the blanks a number of preferably adjustable and removable shoes S are attached to the under side of the annulus M, these shoes being tapered or wedge-shaped and provided with upstanding lugs, through which are tapped bolts s, by which the shoes can be detachably fastened to the annulus. These shoes are attached to the annulus in such positions that as the drill and chucks rotate thereunder the upper ends of the drill-rods come into contact with the shoes, and as the drills travel thereunder said rods are gradually depressed, and during the movement of the drills under the shoes the blank is drilled. When the ends of the shoes are reached, the drills are forced upward by the springs against the annulus and permit the chucks to be partly rotated, so as to bring the button-blanks into position for another drilling operation, and when the spindles reach the next shoe they will be again de-

pressed and the button-blanks again drilled at other points, and so on until the desired number of holes are drilled in the blanks.

The machine shown is adapted to be used for drilling two or four hole buttons. In drilling two-hole buttons two of the shoes are removed, and they are replaced when drilling four-hole buttons. The time for drilling required by this construction of machine can be regulated by the length of the shoes, and by properly tapering the latter the danger of breaking out thin centers of buttons in which the holes are to be drilled may be entirely overcome by causing the drills to so gradually approach the material as to prevent breakage of the centers.

In the machine shown the drills are rotated on their own axes and the chucks are stationary relatively to the drills during the drilling operations, although traveling orbitally therewith; but after each drilling operations the chucks or blank-holders will be partially rotated, so that at the next drilling operation the chucks or blank-holders will be partially rotated on their axes, so that at the next drilling operation the holes will be made at another point in the blank, and this automatic axial rotation of the chucks is accomplished in a very simple manner as follows: The collars D on the spindles B are substantially rectangular, and their outer sides come in contact with an annular flange or ring T, which is fast to the frame of the machine, as shown, and as the chucks travel orbitally around the ring the outer edges of collars D contact with and bear against the ring and prevent rotation of the chucks. Each collar is provided, as shown, with four upstanding pins, (numbered 1 to 4, respectively.) No two of these pins are exactly in line, their arrangement being such that of the two outermost pins the one to the left is always nearer the flange than the one to the right. At proper points around the periphery of the band are located three strikers U U′ U^2, (see Fig. 6,) and as the series of chucks is rotated past these strikers the pin on the left outer corner of the collar D, which pin is always nearest the edge, will come in contact with the striker, and the chuck will be caused to turn one-quarter around the corner of the collar D, projecting through a notch t, t', or t^2 in the annulus T opposite the striker to permit and assist in turning the chuck a full quarter until its side comes flat against the inner surface of the ring. These strikers are located intermediate the shoes S, so that the chucks will be turned in the interval between the drilling operations. Three of these strikers are shown, which will successively partially turn the chucks on their axes, as indicated in Fig. 6, and in the machine shown during each complete cycle of movement every chuck will be turned three-fourths of a revolution on its own axis each time it is carried around by the holder A. A belt V is led over quartering-pulleys v, attached to the frame of the machine, and then around pulleys v', journaled on the two uprights g, as shown, the section of the belt between the pulleys v contacting with the pulleys l on the drill rods or spindles and rotating those drills whose pulleys come in contact with this section of the belt. Thus the drills will be rotated at the proper times, but will not be rotated while passing the feed side of the machine. This drive is substantially like that described in my aforesaid patent.

In operating the machine the opposed series of chucks and drills are traveled or rotated continuously. The operator stands at the side of the machine opposite the depressed portion E′ of the cam E, and as the chucks reach this point and open the drilled blanks they are removed and replaced by undrilled blanks. Then as the chucks travel on they are successively lifted and thereby closed upon the blanks, holding them securely. As each chuck reaches the upper portions of the cam E the corresponding drill O passes under the first shoe and drills the first hole through the blank. After this first hole is drilled and while the drill is separated from the blank the pin on the collar D of such chuck contacts with the first striker U and the chuck is given a quarter-turn on its axis by means of such striker and the corresponding notch t in the ring T. Then the drill and chuck pass under the second shoe, and the second drilling operation is performed. After passing the second shoe the drill is again thrown up by the spring and the chuck is given another quarter-turn on its axis by the striker U′ and notch t'. Then they pass under the third shoe S and the third hole is drilled. After passing the third shoe the drill is again thrown up and the chuck is given another quarter-turn by the striker U^2 and notch t^2, then passes under the fourth shoe, and the fourth hole is drilled. Then the drill is thrown upward and the chuck, passing onto the lower part of the cam E′, drops and releases the drilled button, which may be removed therefrom either by hand or by suitable apparatus, and a fresh blank is supplied to the chuck and the described operation is repeated thereon. The same operation occurs for every pair of drills and chucks in the machine. During each orbital travel of each drill and chuck the drill is depressed four times in drilling four-hole buttons, and the chuck is given three-fourths revolution, the first hole being drilled before the chuck comes into contact with the striker. In drilling two holes it is only necessary to remove the first and third shoes, so that but two holes will be drilled and at diametrically-opposite points.

I do not consider myself restricted to the particular mechanism herein shown and described, although the same has proven very efficient in operation, as it will be easy to change mechanical details while retaining the essential features and advantages of my invention.

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

1. In an automatic button-drilling machine, the combination of a traveling chuck or button-holder and a coöperating drill traveling therewith; with means for causing the drill to operate upon the blank a number of times during the travel of the drill and chuck, substantially as and for the purpose described.

2. In a drilling-machine, the combination of the blank-holder and a drill-holder, and means for traveling the same orbitally; with means for causing the drill to intermittently operate upon the blank a number of times during the travel, substantially as and for the purpose described.

3. In an automatic button-drilling machine, the combination of a button-holder and coöperating drill, and means for traveling the same together; with means for causing the drill to operate a plurality of times upon the blank during the travel of the drill and chuck, and means for shifting the parts relative to each other in the interval between the drilling operations so that the drills will operate at different points on the blanks in the successive drilling operations, substantially as described.

4. In a drilling-machine, the combination of the blank-holder and a drill-holder, and means for moving the same orbitally; with means for causing the drill to intermittently operate upon the blank a number of times and at different points thereof during the travel, and means for adjusting the position of the blank between the drilling operations, substantially as described.

5. In an automatic button-drilling machine, the combination of a series of blank-holders or chucks, a corresponding series of drill-holders opposite the chucks and means for traveling the pairs of drills and blanks together; with means for causing the drills to repeatedly operate upon the blanks in the opposite chucks and at different points of the blank during their travel, substantially as and for the purpose described.

6. In an automatic button-drilling machine, the combination of a series of blank-holders or chucks, a corresponding series of drill-holders opposite the chucks and means for traveling the pairs of drills and blanks together; with means for causing the drills to operate upon the blank in the opposite chuck a number of times during their travel and means for partially rotating each chuck during its travel in the intervals between the drilling operations, for the purpose and substantially as described.

7. The combination of a series of chucks, a corresponding series of drills, and means for traveling the two series together; with means for causing each drill to operate upon the blank in its corresponding chuck and at different points of the blank during its travel, substantially as and for the purpose described.

8. In a button-drilling machine, the combination of a series of chucks, a corresponding series of drills, and means for traveling the two series together; with means for causing the drills to operate repeatedly upon the blanks during their travel, and means for partially rotating the chucks after each drilling operation so as to present the undrilled portion of the button to the drills, substantially as and for the purpose described.

9. The combination of a series of button-blank holders or chucks, a corresponding series of drill-holders, one for and opposite each chuck, and means for traveling the chucks and drills together, means for rotating the drills during part of their travel, means for repeatedly causing the drills to operate upon the blanks during their travel, and means for partially rotating the chucks on their axes in the interval between the drilling operations, for the purpose and substantially as described.

10. The combination of a series of button-blank holders or chucks, a corresponding series of drill-holders, one for and opposite each chuck, means for moving the chucks and drills in an orbital path, and means for rotating the drills during part of their orbital movement, with means for repeatedly causing the drills to operate upon the blanks during their travel, and means for partially rotating the chucks in the interval between the drilling operations during their travel, for the purpose and substantially as described.

11. The combination of a button-blank holder and a drill coöperating therewith, both mounted upon a movable support and moving together, and cams or shoes for forcing said drill to repeatedly operate upon the blank during the travel, substantially as described.

12. The combination of a button-blank holder or chuck, a drill coöperating therewith, both mounted upon a rotatable support and moving in an orbital path, a spring for moving said drill away from the chuck and a series of cams or shoes for forcing said drill to repeatedly operate upon different parts of the blank in the chuck during their travel, substantially as described.

13. The combination of a chuck, a drill cooperating therewith, both moving together in a linear path; a spring for moving said drill away from the blank, and cams or shoes for forcing said drill to operate upon the blank during its travel; with means for partially rotating the chuck after each drilling operation, substantially as described.

14. The combination of a button-blank holder or chuck, a drill coöperating therewith, both mounted upon a rotatable support and moving in an orbital path, a spring for moving said drill away from the blank, and a series of cams or shoes for forcing said drill to operate upon the blank during its travel; with means for raising the chuck after it has

received the blank and means for partially rotating the chuck after each drilling operation, substantially as described.

15. In a button-drilling machine, the combination of a chuck or blank-holder and means for moving the same in a lineal path, a collar on said holder, a fixed bearing-flange against which said collar contacts to prevent rotation of the chuck, and means for partially rotating the chuck on its axis at intervals in its travel, for the purpose and substantially as described.

16. In a button-drilling machine, the combination of a chuck or blank-holder and means for moving the same in a lineal path, a collar on said holder, and a fixed bearing-flange against which said collar contacts to prevent rotation of the chuck; with strikers adapted to engage pins on said collar and partially rotate the chuck at intervals in its travel beside the flange, for the purpose and substantially as described.

17. In a button-drilling machine the combination of a chuck or blank-holder and means for moving the same lineally, a collar on said holder, a fixed bearing-flange against which said collar contacts to prevent rotation of the holder, and means for partially rotating the chuck at intervals in its travel; with a drill arranged above and traveling with said chuck, means for rotating said drill, and means for causing said drill to operate upon the blank in the chuck during their travel, substantially as described.

18. In a button-drilling machine the combination of a chuck or blank-holder and means for moving the same in an orbital path, a collar on said holder, a fixed bearing flange or ring against which said collar contacts to prevent rotation of the holder, and fixed strikers adapted to engage pins on said collar and partially rotate the chuck at intervals in its travel with a drill arranged above and traveling with said chuck, means for rotating said drill, and means for causing said drill to operate upon said blank during the travel and while the chuck is kept from rotating, substantially as and for the purpose described.

19. The combination in a button-drilling machine of the blank-holder or chuck adapted to move in an orbital path, and a collar on said chuck, a ring against which said collar bears during the travel of the chuck to prevent rotation thereof, and a fixed striker beside said ring adapted to engage pins upon said collars and cause a partial rotation of the chuck as it passes the striker, substantially as described.

20. The combination in a button-machine of the blank-holder, or chuck adapted to move in an orbital path, and a collar on said chuck provided with upstanding pins, a ring beside said path against which said collar bears during the travel of the chuck to prevent axial rotation thereof, fixed strikers beside said ring adapted to engage the pins on said collar and cause a partial rotation of the chuck on its axis as it passes each striker, said ring being notched to permit turning of the collar when the striker engages the same, substantially as described.

21. The combination in a button-machine, of the blank-holder or chuck adapted to move in an orbital path, and a collar on said chuck, a ring against which said collar bears during the travel of the chuck to prevent axial rotation thereof, fixed strikers beside said ring adapted to engage pins upon said collar and cause a partial rotation of the chuck on its axis as it passes the strikers; with a drill-holder and drill arranged opposite and moving with the chuck, and means for causing said drill to operate upon the blank in the chuck during the travel of the parts in the intervals between the partial rotation of the chuck, substantially as described.

22. The combination in a button-machine, of the blank-holders or chucks adapted to move in an orbital path, and a collar on each chuck, a fixed ring against which said collars bear during the travel of the chucks to prevent axial rotation thereof, fixed strikers beside said ring adapted to engage pins upon said collars and cause a partial rotation of each chuck as it passes the strikers, said ring being notched to permit turning of the annular collar when the striker engages the same; with a series of drill-holders and drills—one for each chuck—and arranged opposite and moving with the chucks, and means for causing said drills to operate upon the blanks during the travel of the parts in the intervals between the partial axial rotation of the chucks, substantially as described.

23. In a drilling-machine, the combination with a button-holder or chuck, a corresponding drill above and opposite the chuck and means for causing the drill and holder to travel together lineally; with means for adjusting the drill eccentric to the chuck for the purpose and substantially as described.

24. In a button-drilling machine, the combination with a series of button-holders or chucks and a corresponding series of drills above and opposite the holders and means for causing the drills and holders to travel together lineally; with means for adjusting the drill-support concentrically to the chuck-support whereby the drills are caused to operate eccentrically upon the button-blanks held in the chucks, substantially as described.

25. The combination of a series of drill-holders mounted upon a common movable support; with a drill-setting arm mounted upon a stationary support beside the drill-holder and adapted to be swung under the drill-holders and support the drills while being fastened in the holders, for the purpose and substantially as described.

26. The combination of the drill-spindle, the casting supporting the same, the bolt securing said casting to a suitable support, a pin on said support projecting into an opening in said casting and the bolts tapped

through said casting and engaging said pin, for the purpose of adjusting the inclination of said casting on said support, for the purpose and substantially as described.

27. The combination of the series of chucks mounted on a rotatable support, and means for partially rotating the chucks axially at suitable intervals; with a drill-holder located above and rotating with the chuck-support, a series of drills on said holder, the annular ring supported above said drills, the shoes attached to said ring and adapted to depress the drills, and means for rotating said drills, the drills operating upon the blanks in the intervals between the partial rotations of the chucks, substantially as described.

28. The combination of the annular series of chucks mounted on a rotatable support, the fixed ring beside said support, the collars on the chuck-spindles engaging said ring to prevent rotation of the holders, and the strikers adapted to engage said collars and partially axially rotate the chucks at suitable intervals; with a drill-holder located above and rotating with the chuck-support, a series of drills on said holder, the annular ring supported above said drills, the cams or shoes attached to said ring and adapted to depress the drills, and means for rotating said drills, the drills operating upon the blanks in the intervals between the partial rotations of the chucks, all substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

NICHOLAS BARRY, JR.

In presence of—
J. F. DEVITT,
L. J. HORAN.