No. 640,029. Patented Dec. 26, 1899.

C. R. RICHARDS.

MACHINE FOR TURNING HEADS OF CARTRIDGE SHELLS.

(Application filed May 2, 1899.)

(No Model.) 7 Sheets—Sheet 1.

Fig. 1.

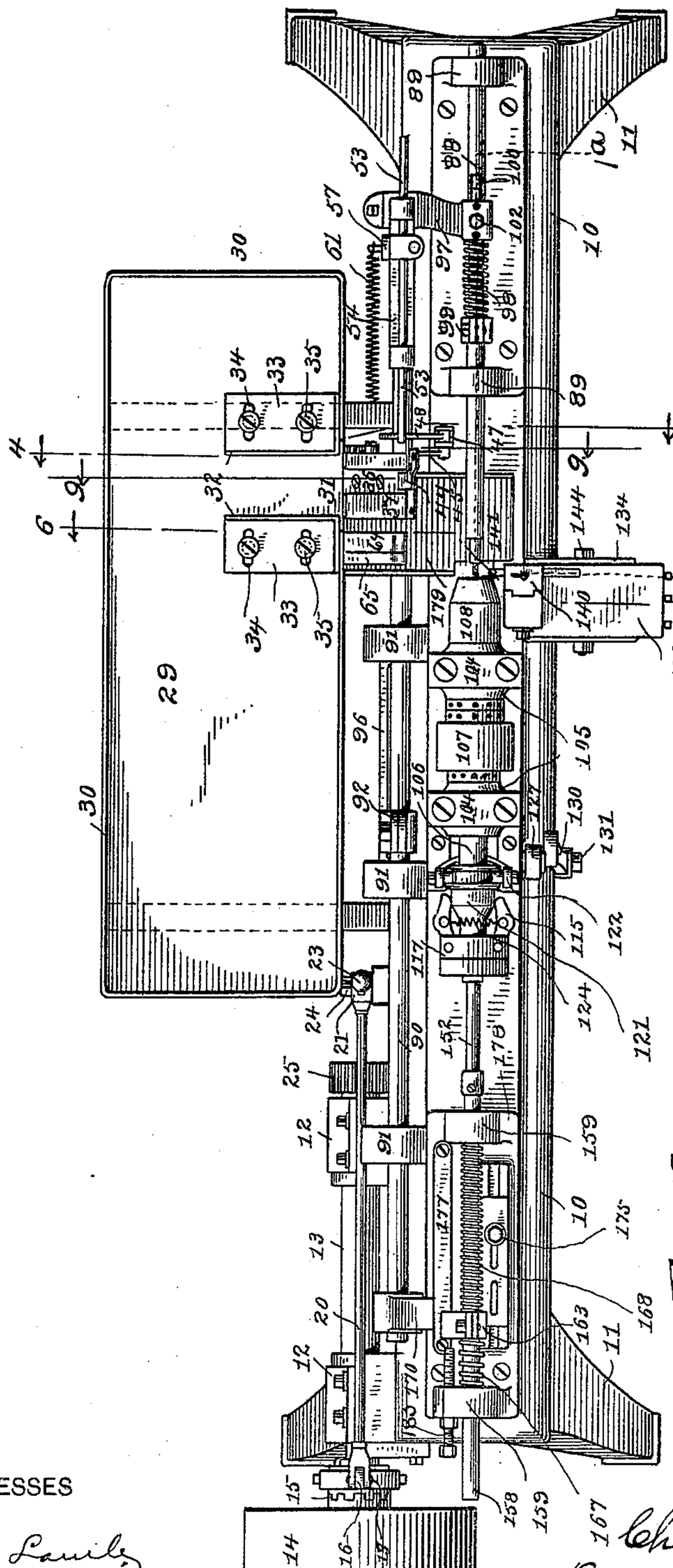

Fig. 1a.

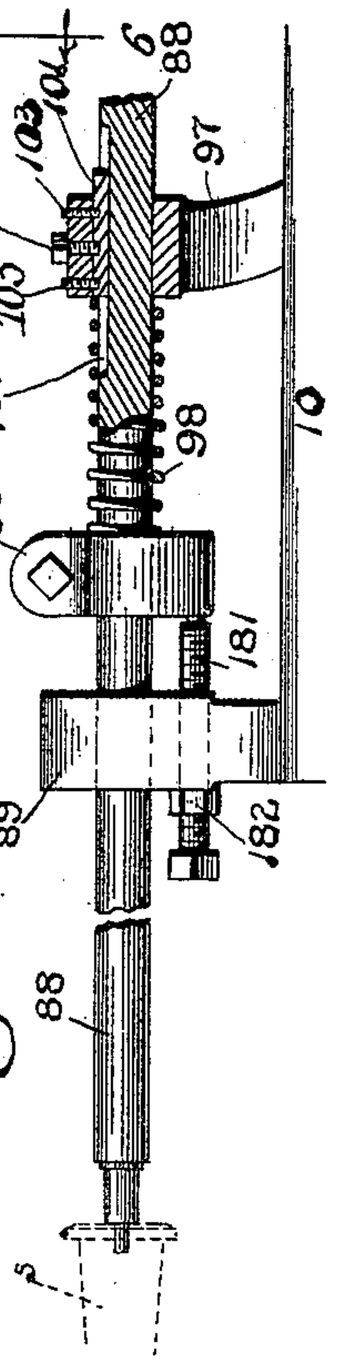

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Fig. 2.

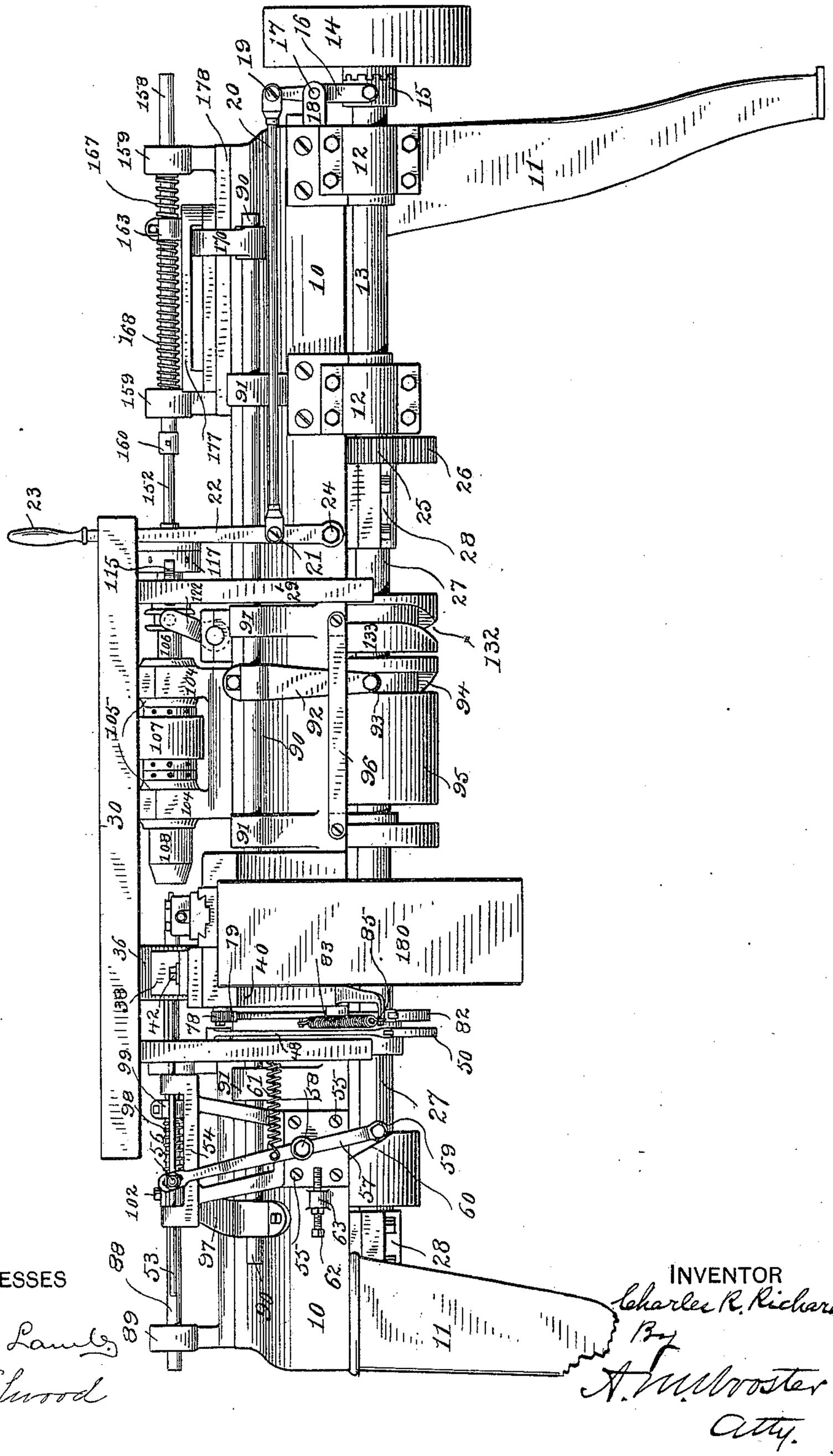

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Fig. 3.

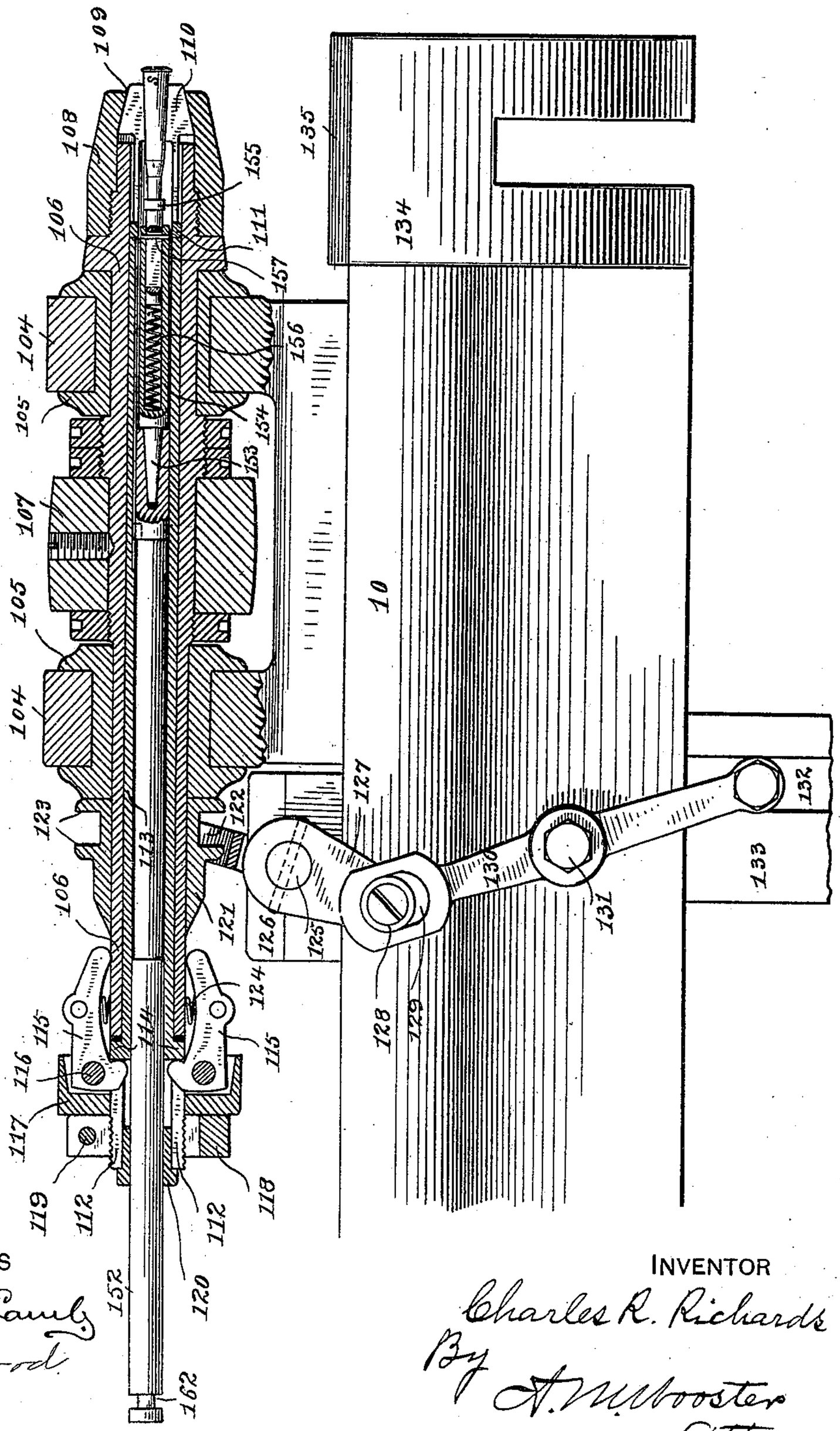

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Fig. 4.

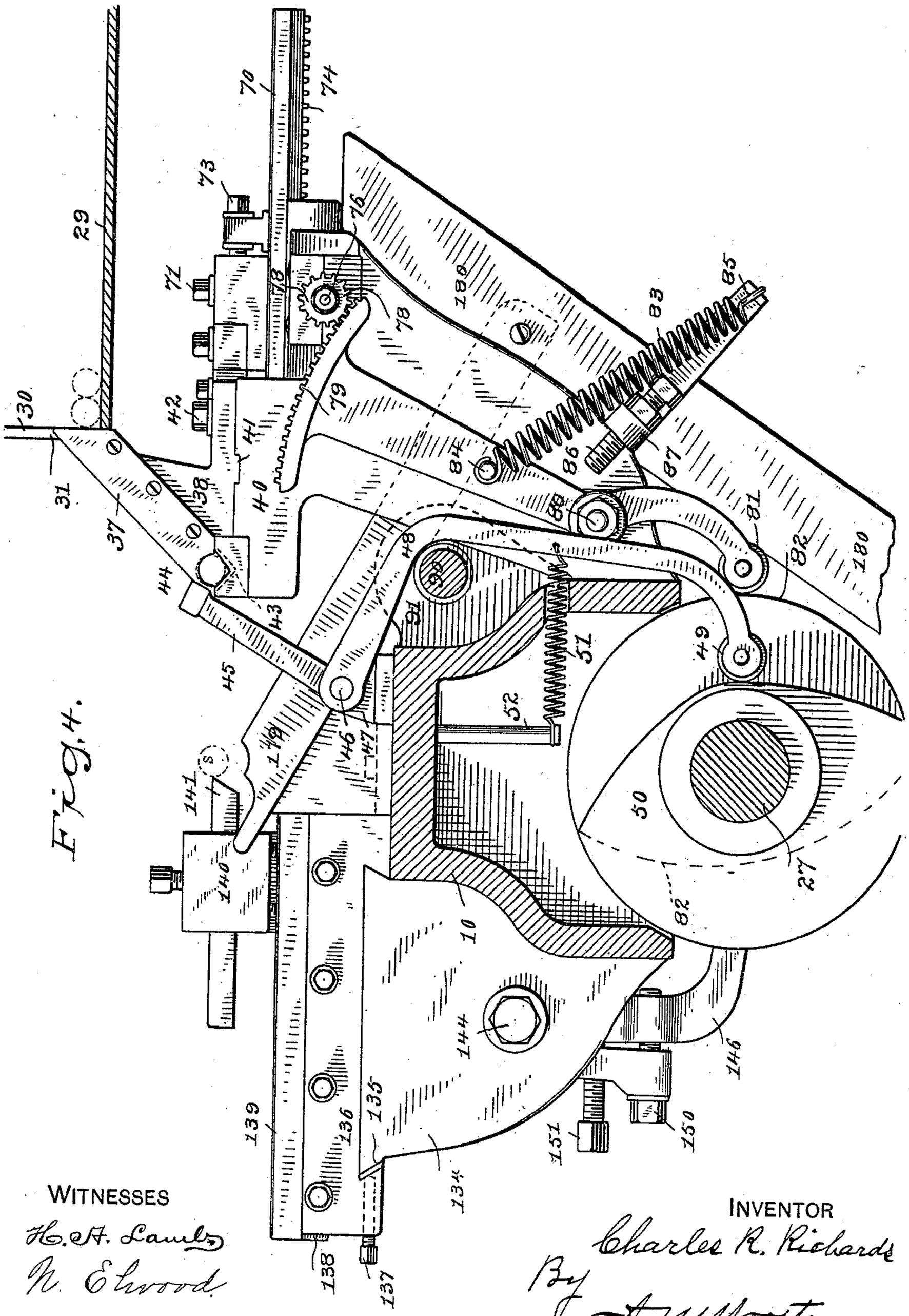

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Fig. 5.

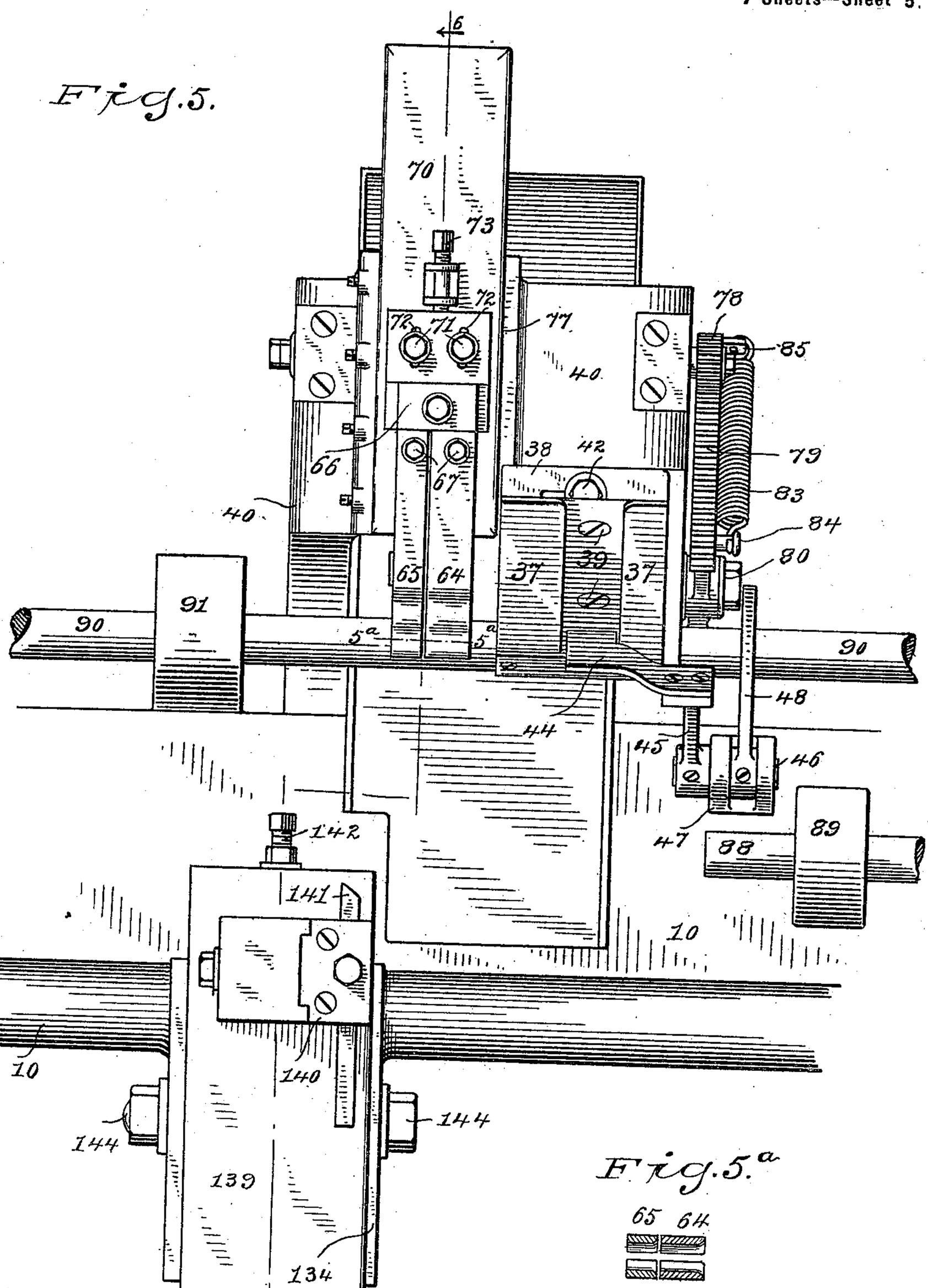

Fig. 5a.

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(No Model.) 7 Sheets—Sheet 6.

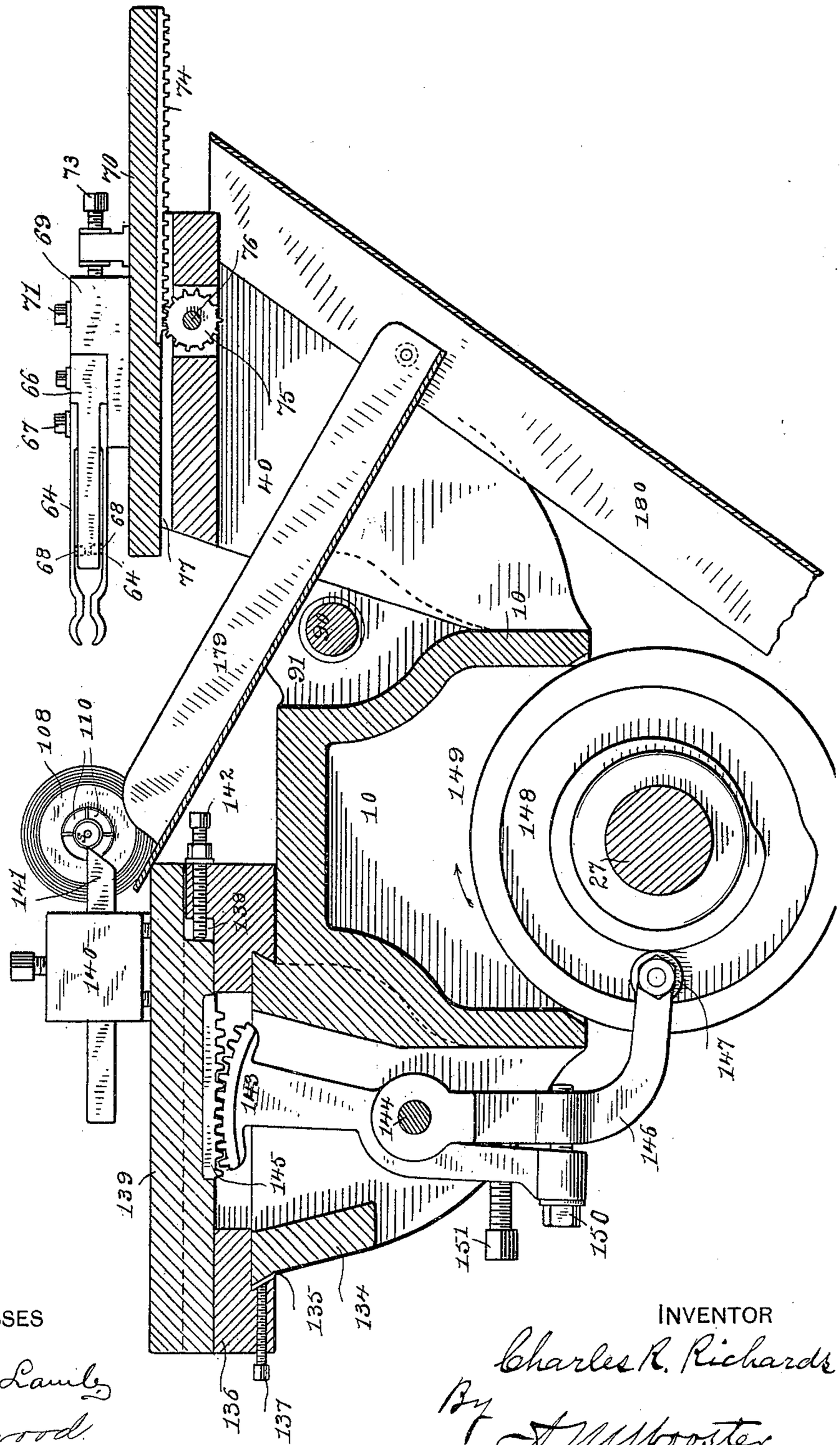

Fig. 6.

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(Application filed May 2, 1899.)

(No Model.) 7 Sheets—Sheet 7.

Fig. 8.

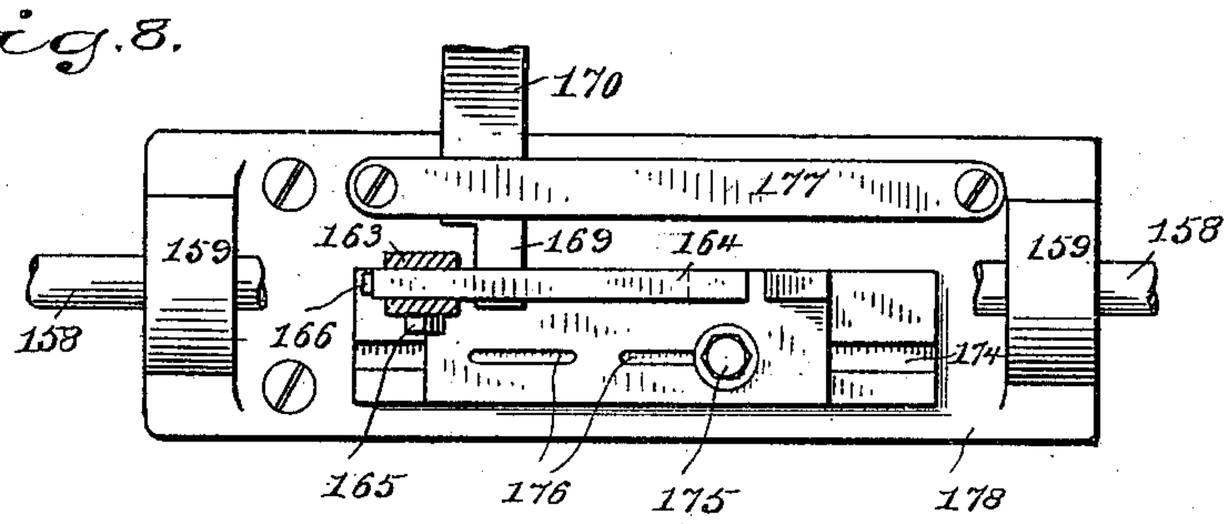


Fig. 7.

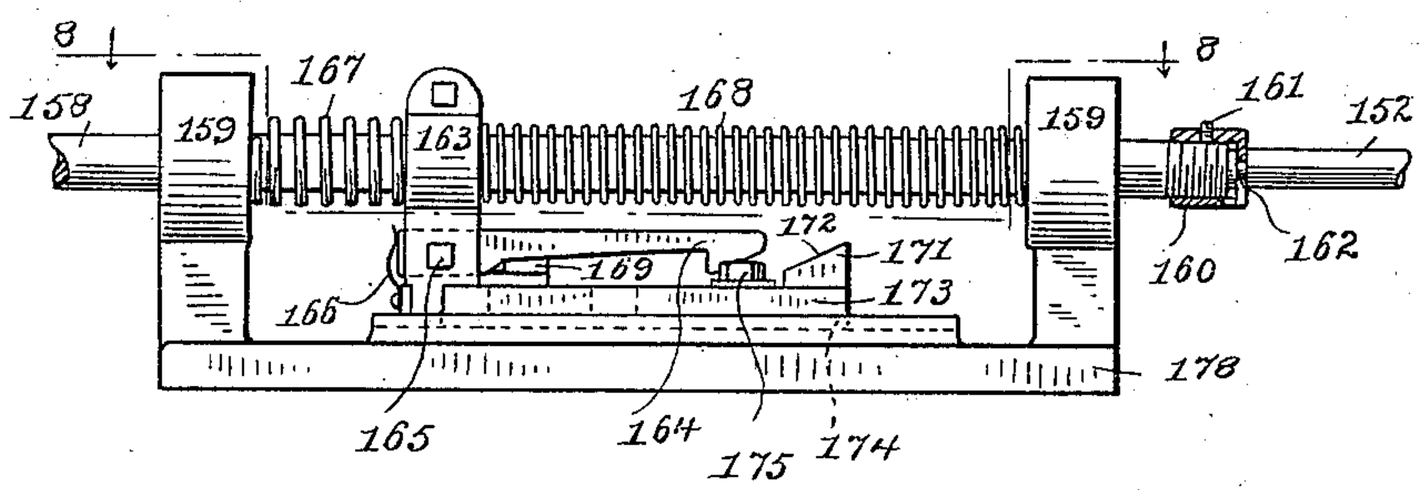
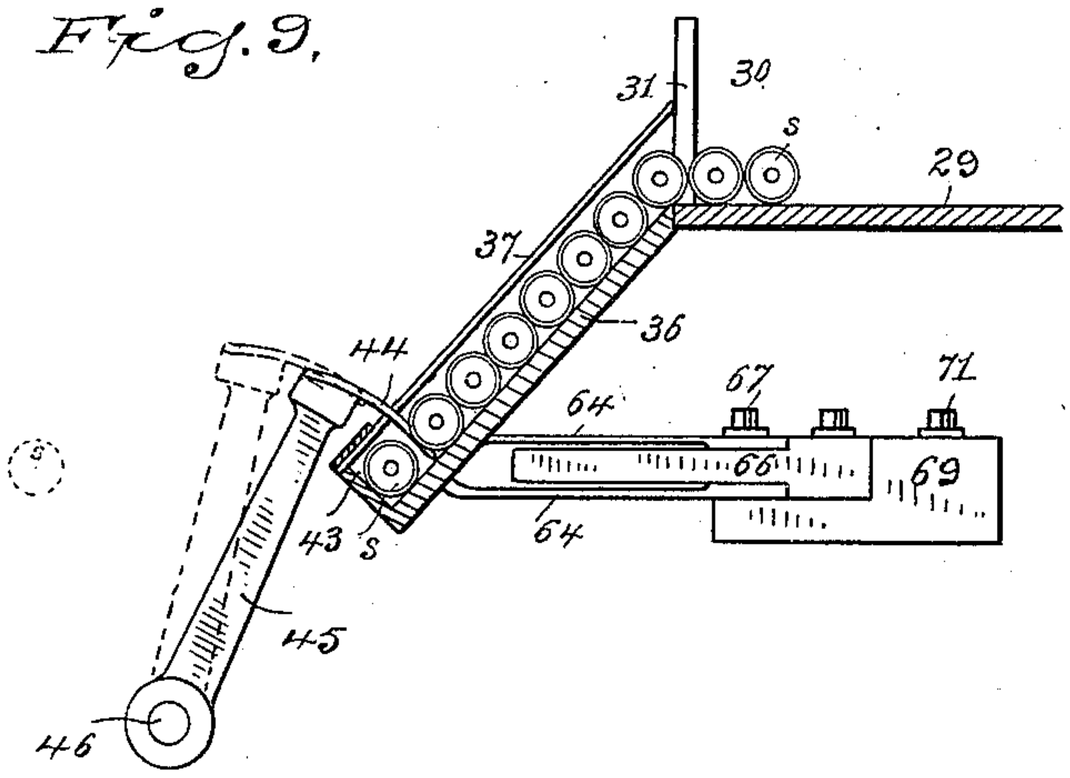


Fig. 9.



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UNITED STATES PATENT OFFICE.

CHARLES R. RICHARDS, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO THE UNION METALLIC CARTRIDGE COMPANY, OF SAME PLACE.

MACHINE FOR TURNING HEADS OF CARTRIDGE-SHELLS.

SPECIFICATION forming part of Letters Patent No. 640,029, dated December 26, 1899.

Application filed May 2, 1899. Serial No. 715,329. (No model.)

To all whom it may concern:

Be it known that I, CHARLES R. RICHARDS, a citizen of the United States, residing at Bridgeport, county of Fairfield, State of Connecticut, have invented a new and useful Machine for Turning Heads of Cartridge-Shells, of which the following is a specification.

This invention relates to machines for making metallic cartridge-shells, and has for its object the production of a machine which will rapidly take the shells as produced or formed by diework and transfer them to turning devices, which turn down the edges of the heads of the shells to the required standard with the greatest accuracy and uniformity.

As is well known, magazine-rifles and machine-guns of approved pattern require to be supplied with cartridges of the utmost uniformity in all respects, particularly in those portions which are acted upon by the feeding mechanism or the shell-extractors, and the heads of the shells are the parts that must be formed most accurately, both as to diameter and the thickness of the flange and the depth, width, and location of the groove usually formed adjacent to the head. To meet these requirements, it has been necessary heretofore to employ more or less hand labor of the skilled class and to exercise a large amount of supervision and inspection; but the machine herein described and claimed rapidly produces the finished shells with their heads accurately and uniformly shaped to meet the most rigid inspection, and this with only the services of a feeder having no particular degree of skill.

The invention consists in the construction and combination of parts, substantially as hereinafter described and claimed.

In the accompanying drawings, Figure 1 represents a plan view of the entire machine embodying the invention. Fig. 1ª represents a slightly-enlarged section on the line 1ª 1ª of Fig. 1. Fig. 2 represents a front elevation of the machine. Fig. 3 represents a detail side elevation and a longitudinal section of the clutch. Fig. 4 represents a section on line 4 4 of Fig. 1, enlarged from said figure. Fig. 5 represents a plan view of the parts shown in Fig. 4 with the assembling table or shelf removed. Fig. 5ª represents a detail section on line 5ª 5ª of Fig. 5. Fig. 6 represents a section on the line 6 6 of Figs. 1 and 5, drawn to the scale of the latter. Fig. 7 represents a detail elevation of the mechanism shown above the bed at the right in Fig. 2 and somewhat enlarged and looking from the rear of the machine. Fig. 8 represents a section on line 8 8 of Fig. 7. Fig. 9 represents a detail section on line 9 9 of Fig. 1, somewhat enlarged from that figure.

Similar reference characters indicate the same parts in all the views.

10 indicates the bed or frame of the machine, having suitable legs 11 and having bearings 12 (see Figs. 1 and 2) for the driving-shaft 13, said shaft having a driving-pulley 14 mounted on its outer end and adapted to be connected to or disconnected therefrom by means of a suitable clutch 15, which may be of any preferred pattern, and hence is not shown in detail. The clutch is operated by means of a lever 16, pivoted at 17 to a bracket 18, projecting from the bed and pivotally connected at its upper end 19 to a rod 20, which in turn is connected at its end 21 to a lever 22, having a handle 23 and pivoted at 24 to the bed 10. By means of said hand-lever 22 the entire machine may be started or stopped, it being understood that the pulley 14 is supposed to be constantly driven.

At the inner end of the shaft 13 is a pinion 25, which meshes with a gear 26 on the shaft 27, which will be hereinafter generally referred to as the "cam-shaft" and which is supported below the bed in bearings 28.

The parts of the machine will now be described, as near as may be convenient, in the order in which the cartridge-shells are treated or acted upon.

An assembling table or shelf 29, supported by brackets 29′, is provided with a flange 30, which is open at one point, as indicated at 31 in Fig. 1, said table being of a size sufficient to accommodate a large number of shells and by the outer side of which the operative sits or stands to arrange the shells, as presently described. Two upright guides 32 are secured to the table adjacent to the opening 31, the base-plates 33 of the guides being slotted, as at 34, whereby the screws 35, which pass

through the slots into the table, may adjustably secure the guides according to the lengths of the particular size of shells to pass between them. The operative merely arranges or assembles the shells between the guides with their heads all against the guide (shown at the right in Fig. 1) and pushes them through the opening 31. Inclined downwardly from the opening 31 is a plate or chute 36, having overhanging or inwardly-bent flanges 37, (see Figs. 1, 4, and 9,) which chute is preferably kept full, or nearly so, by the attendant. The said flanges may be adjustable similarly to and for the same purposes as the guides 32; but preferably a chute having a different width is substituted for that shown when a change is made in the size of the shells to be operated upon. The chute is supported by a block 38, to which it is secured, as by screws 39, (see Fig. 5,) and the said block is secured to a bracket 40, (see Fig. 4,) supported by the bed or frame of the machine. The block is provided with a rib 41 across its under side, which fits in a groove in the bracket, and a bolt 42 secures the block to said bracket, the rib and groove serving to insure the proper position of the block and chute and aiding in holding them in place.

At the lower end of the chute is a trough-shaped receiver 43, in which the shells are successively deposited by gravity and from which they are pushed endwise one by one, as presently described. To prevent the heads of the lower two shells from interfering with each other as the lower one is pushed out of the receiver, a lifter is provided for the series of shells in the chute above the one that is in the receiver, which lifter is timed to act just before the pusher advances and to hold said series slightly elevated during the advance of said pusher. The said lifter (see Fig. 9 in connection with Figs. 4 and 5) comprises a plate or finger 44, having its end curved, so that as it moves from the dotted to the full line position indicated in Fig. 9 it will enter between the two lower shells and then slightly lift or elevate all the shells above it in the chute. The said finger 44 is carried by an arm 45, rising from a rock-shaft 46, that is mounted in bearings 47, secured to the bed of the machine, the curve of said finger being eccentric to its path of oscillation for the purpose just above described. To said rock-shaft is also secured an arm 48, which extends around the slide-rod hereinafter described and then downward and at its lower end is provided with a roll 49, bearing on a cam 50, carried by the shaft 27. A spring 51 is connected to the arm 48 and to a fixed pin or stud 52 and imparts the advancing movement to the lifter-finger, the cam acting to retract said finger.

Immediately after the lifter has operated the shell is pushed from the receiver 43 by means of the push-rod 53, (see Figs. 1 and 2,) which is mounted to slide in bearings formed in a bracket 54, which is attached to the side of the bed, as by screws 55. The push-rod is provided with a pin or roll 56, projecting into a short slot in the upper end of a lever 57, pivoted at 58 to the lower part of the bracket 54 and having a roll 59 at its lower end bearing on a cam 60 on the shaft 27. A spring 61, connected to the lever 57 above its pivot and to a fixed part of the frame, imparts the advancing movement to the push-rod, and the cam 60 acts to retract said rod through the medium of the said lever 57. An adjustable stop, consisting of a screw 62, threaded in a boss 63 on the side of the bed-frame, serves to limit the advancing movement of the push-rod and can be adjusted according to the size of the shells operated upon by the machine to properly locate them in the transferrer, which will now be described.

The transferrer comprises two pairs of spring-jaws 64 65, which at the moment of the advance of the push-rod are in line with the receiver 43, but which are adapted to reciprocate from the position shown in Figs. 1, 5, 6, and 9 to advance the shell carried thereby to the position indicated by the dotted circles in Figs. 4 and 9. The said spring-jaws consist of a pair of upper and lower plates, secured at their rear ends to the upper and lower sides of a block 66. The jaw-plates are secured, as by bolts 67, to the block 66, and the latter projects forward between the plates and is provided with screws 68, which when the plates are removed may be adjusted as to the amount of their projection. The said screws 68 serve as adjustable stops to hold the jaws normally at the required distance apart according to the size of the shells to be received between them. The edges of the jaws on the side toward the push-rod are curved or beveled, as indicated in Fig. 5ª, to prevent the heads of the shells from catching when ejected from between them.

The block 66 is secured in a recess formed in a main block 69, which in turn is secured to the rack-plate 70, as by bolts 71, passing through slots 72. The forward adjustment of the block 69 on the rack-plate is obtained by a screw 73, (see Fig. 5,) mounted in bearings on the rack-plate and bearing against the rear end of the main block 69. The slots 72 in said block 69 permit of this adjustment, and the bolts 71 firmly hold said block and the jaws in their proper position on the rack-plate, according to the size of the shells to be operated upon.

So far as the passage of shells into the space between the front ends of the jaw-plates is concerned, each of said plates might be single instead of being cut to form separate jaws 64 and 65; but when the shells are to be pushed out of the transferrer, as hereinafter described, it will readily be understood that as soon as the shell-head enters between the jaws the jaws would be spread thereby, so as to hold the shell only by its head if the jaws were single. By making the jaws double, as described, they are made wide enough to

properly grasp the shell and transfer it steadily, and yet when the first movement of forcing the shell out of the jaws occurs the head thereof spreads only the jaws 64, leaving the jaws 65 still grasping the body of the shell to steady it during the pressing of the shell into the turning-chuck, all as will be more apparent hereinafter.

Returning to the details of the mechanism for operating the transferrer, it will be seen that the plate 70 is provided with rack-teeth 74 on its under side, (see Fig. 6,) which teeth are engaged by a pinion 75 on a shaft 76, mounted in bearings formed in the bed 77, carried by the top of the bracket 40, said plate being fitted to reciprocate in suitable ways formed in or on said bed. At the other end of the shaft 76 is secured a pinion 78, (see Figs. 4 and 5,) which meshes with and is operated by a toothed segment 79, pivoted to the bracket 40 at 80 and having a roll 81 at its lower end, said roll being held in engagement with a cam 82 on the shaft 27 by means of a spring 83, connected at one end to a pin 84 in the segment above its pivot and at its other end to a projection 85 from said bracket. As will readily be understood from Figs. 4 and 6, the advancing movement of the plate 70 and the transferrer is imparted by the spring 83, while the cam 82 acts to retract said parts. An adjustable stop 86, consisting of a screw threaded in a boss 87 on the bracket 40 and located in the path of movement of the swinging segment, serves to limit the advancing movement of the transferrer.

After the rod 53 has pushed a shell from the receiver 43 between the jaws of the transferrer the former recedes and the transferrer advances in a direction at a right angle to the path of movement of the push-rod and carries the shell to a position in line with and between the chuck and the presser-rod, which latter pushes the shell from the transferrer-jaws into the chuck, as will now be described. The said presser-rod is indicated in Figs. 1 and 2 as fitted with a tool smaller than said rod to act on the shell, said tool being omitted in Fig. 5.

The presser-rod 88 is mounted to reciprocate in bearings 89 on the top of the bed 10, as shown at the right in Fig. 1 and at the left in Fig. 2, and is operated (through connections that will be presently described) by the slide-rod 90, which is mounted to reciprocate in bearing 91, formed on the side of the bed or frame, as clearly shown in Fig. 2. An arm 92 is attached to the slide-rod substantially midway of its length and is provided with a roll at its lower end 93, said roll entering a cam-groove 94, formed in the hub 95, carried by the shaft 27. A guide strip or bar 96 is attached at its ends to the side of the bed or frame and is cut away or reduced in thickness between its ends, as indicated by dotted lines in Fig. 2, to form a space between said bar and the side of the bed or frame for the travel of the arm 92, said strip or bar therefore serving to hold the arm with its roll in the cam-groove and also preventing the slide-rod from rotating in its bearings.

The slide and presser rods are connected so that the former operates the latter by means of an arm 97, rigidly but adjustably secured to the slide-rod near its end and extending upward and having a slide fit on the presser-rod, a spring 98 being coiled about the presser-rod between a stop 99, secured to said rod, and the upper end of the arm 97. It will be understood that the movement of the slide-rod in one direction advances the presser-rod in the same direction by means of the arm 97 and the spring 98, and that the presser-rod therefore pushes the shell from the jaws of the transferrer into the chuck with a yielding pressure. The return movement of the presser-rod is obtained by the following means: As shown in Figs. 1 and 1ª, the presser-rod is formed with a groove or flattened portion 100, in or on which is fitted a gib 101, which receives a bolt 102 and steadying-screws 103, tapped through the upper end of the arm 97. The gib 101 therefore must travel rigidly with the arm 97, but does not affect the yielding advancing movement of the presser-rod. On the return movement of the slide-rod 90 and the arm 97, however, the end of the gib abuts against the end of the groove or flattened portion 100 of the presser-rod 88 and positively retracts the presser-rod always to a given distance to insure the retraction of said rod to be out of the way of the next advancing movement of the transferrer.

The chuck into which the shell is pressed by the rod 88 and the ejector operating within the chuck will next be described.

Referring particularly to Fig. 3, 104 denotes two standards on the bed 10 of the machine, said standards having bearing-bushings 105 for the hollow spindle 106, to which the driving-pulley 107 is applied in the ordinary or any preferred manner and to the front end of which is secured the nose-piece 108, having inwardly-tapering walls 109. The chuck-jaws 110 have the usual inclined or tapered outer walls to engage the tapering walls 109 of the nose-piece, so that longitudinal movement of the one relatively to the other will contract the jaws upon the shell *s*, and the usual spring-arms of the jaws are connected at their rear ends by the ring or short sleeve 111. The spring-arms of the jaws normally tend to open them, and said arms have sufficient strength to cause the inclined outer walls thereof to so act against the tapering inner surface of the nose-piece as to move the jaws and the ring 111 to the left (referring to Fig. 3) when permitted to do so by the sleeve 113, presently described. The rear end of the hollow spindle is formed with two slots 112, and a sleeve 113 is contained within said spindle and extends from the ring 111 rearward to a point just past the inner ends of the slots 112. This inner sleeve 113 is provided with lugs 114, which extend radially

into the slots 112 and prevent rotation of the sleeve within the hollow spindle and also form abutments to be acted upon by the short arms of levers 115 to force the sleeve and the chuck-jaws to the right to clamp the said jaws on the shell. The levers 115 are pivoted at 116 in slots formed in a collar 117, mounted on the hollow spindle, said collar being held in its proper position on the spindle by a clamp-nut 118, threaded on the rear end of said spindle. The clamp-nut is split, as indicated in Fig. 3, and provided with a bolt 119, by means of which it may be clamped after it has been adjusted to hold the collar 117 and its levers 115 in proper longitudinal position to cause the inner ends of the levers to give the desired amount of thrust to the inner sleeve. To prevent the rear end of the hollow spindle, which is split by the formation of the slots 112, from being compressed by the action of the clamp-nut, a short sleeve or bushing 120 is inserted in the end of the said spindle and bound therein by the clamping action of said nut.

To operate the levers at the proper time to shift the inner sleeve and cause it to effect the clamping action of the chuck-jaws upon the shell which has been pressed between them by the rod 88, a cone-sleeve 121 is mounted on the spindle 106 and adapted to be shifted lengthwise thereof by a lever 122, having a yoke engaging between two flanges or collars 123, formed on said cone-sleeve. The cone-shaped end of said sleeve 121 when shifted under the long arms of the levers 115 (see Fig. 1) forces them outward and causes the short arms of the levers to act on the lugs 114 of the inner sleeve 113 for the purpose hereinbefore described. The long arms of the levers 115 are connected by springs 124 (see Fig. 1) to hold them inward and prevent their being acted on by centrifugal force. The cone-sleeve-shifting lever 122 is carried by a rock-shaft 125, mounted in bearings 126 on the bed 10, and the outer end of said shaft is provided with an arm 127, having a pin or roll 128, entering a slot 129 in the upper end of a lever 130, pivoted at 131 to the side of the bed or frame 10. The lower end of said lever 130 is provided with a pin or roll entering a cam-groove 132, formed in a hub 133, carried by the shaft 27, as shown in Fig. 2. In said figure the lever 130 is not shown, as it is located on the other side of the machine.

After the shell has been pushed from the transferrer-jaws into the clutch and has been grasped thereby through the operation of the mechanism above described the cutter for finishing the head of the shell is advanced to the position indicated in Fig. 6. Said cutter and its operating mechanism will now be described.

A bracket or wing casting 134, projecting from the side of the frame opposite the table 29, is formed with ways 135, to which is fitted a slide 136, said slide being moved, however, only when it is desired to adjust the cutter laterally, a clamping-screw to hold the slide in position being shown at 137. The top of the slide 136 is formed with ways 138 at a right angle to the ways 135 for the slide or tool-carriage 139, having a tool-post 140 of ordinary or preferred construction for the cutter 141. An adjustable stop-screw 142 is carried by the slide 136 and acts as a forward abutment for the tool-carriage to limit the forward movement of the cutter.

The tool-carriage is reciprocated by means of a toothed segment 143, pivoted at 144 in an opening in the bracket or casting 134, the teeth of said segment meshing with the teeth of a rack 145 on the under side of the slide 139. Mounted on the pivot 144 is an arm 146, having a roll 147, engaging a cam-groove 148 in the side of a disk 149 on the shaft 27. A bolt 150 passes loosely through an opening in the end of the lower arm of the segment 143 and is threaded in the arm 146, while a screw 151 is threaded in the said arm of the segment above the bolt 150 and bears against the arm 146. It will be readily understood that by suitably adjusting the bolt 150 and screw 151 the angle of the arm 146 to the segment can be adjusted to cause the reciprocations of the cutter to begin and end at different points relatively to the shell in the chuck. The movement of the cutter is a slight one under the action of the cam-groove 148, and it is preferable that it have a uniform amount of movement whether adjusted to operate on the heads of large or small shells.

The cam-disk 149 rotates in the direction of the arrow in Fig. 6, and the shape of the groove 148 is such as to slowly advance the cutter and quickly retract it, both movements taking place during less than half the rotation of the cam-shaft, thus leaving the cutter stationary, while the completed shell is ejected and another inserted in the chuck.

The mechanism for ejecting the shell after being turned will now be described. A rod 152 extends into the sleeve 113 (see Fig. 3) and is free to reciprocate therein and is provided with a feather or rib entering a spline-groove in said sleeve, so that both rotate together. The inner end of the rod is formed with a socket to receive the tapered end 153 of the ejector and hold it with a drive fit. The ejector is bored out to form a barrel 154 to receive a pin or plunger having a head 155, a spring 156 being confined between the inner end of the ejector-plunger and the bottom of the socket in which it is held. The plunger is held from being ejected by the spring 156 by means of a small pin 157, passing through a longitudinal slot in the plunger into the walls of the barrel 154. When a shell is pushed into the chuck by the presser-rod 88, the inner end of the shell comes in contact with the head 155 of the ejector, the spring 156 of which permits the head to yield to the necessary extent. The chuck-jaws then close on the shell, and the latter is held thereby while the cutter is advanced and while the head of

the shell is being turned down by the cutter. When the cutter and presser-bar have receded and the chuck-jaws open by the operation of mechanism hereinbefore described, the spring 156 is insufficient to eject the shell with certainty, and hence the rod 152 and the injector are given a short quick forward movement by the mechanism which will now be described.

Referring to Figs. 1, 2, 7, and 8, a slide-rod 158 is shown as mounted to reciprocate in bearings 159, carried on the bed 10 at the right hand thereof, as viewed in Fig. 2, said rod being coupled to the ejector-rod 152 by means of a cap 160, screwed on the end of the former and held there by a set-screw 161 and having a slot the walls of which engage an annular groove 162, formed near the end of the rod 152, in order that the ejector-rod may rotate with the chuck-spindle while the slide-rod 158 is non-rotary. Firmly secured to the slide-rod 158 is an arm 163, having a latch-shaped hook 164, pivoted at 165 to its lower end, a leaf-spring 166 being secured to said arm and bearing against the flat rear end of the hook to keep the latter normally in the position shown in Fig. 7. Two coiled springs 167 168 surround the rod 158 and are confined between opposite sides of the arm 163 and the sides of the bearings 159 and serve to keep the said arm and the slide-rod 158 in the position shown in Fig. 7 until forced out of that position by the engagement with the hook 164 of a striker or finger 169, which is formed by the inwardly-bent end of an arm 170, secured to the slide-rod 90. The arm 170 projects upward from the rod 90 and is bent inward over the top of the bed and is formed with the finger 169, which extends under the hook 164 and rides freely thereunder during the greater portion of the stroke of the slide-rod 90. During the latter part of the stroke of the rod 90 toward the right, as viewed in Fig. 7, the finger 169 engages the abrupt shoulder of the hook and gives it a quick movement to the right, and with it the rods 158 and 152, and causes the ejector to force the completed shell out of the chuck, as hereinbefore described. It is preferable, however, that the hook 164 shall be released from the finger 169 before the latter reaches its limit of movement in that direction, so that the spring 168 may throw the arm 163 and the hook back against the buffer-spring 167 and with them retract the ejector. To effect this release of the hook, I provide a block 171, having an inclined top 172, said block being carried by a plate 173, having a rib fitting a groove 174 in the top of the bed or frame and secured by one or more screws 175, passing through slots 176. The plate 173 may be set at the required point to cause the inclined top of the block 171 to effect the release of the hook 164 from the actuating-finger 169 by the inclined portion of said hook riding up on the block 171 above the plane of movement of the finger. The actuating-finger 169 does not move as far as the block 171, and on its return it strikes the inclined face of the hook, lifts it, and passes under it, ready to actuate it again to eject the next shell. When the hook 164 is disengaged from the finger 169, the spring 168 acts on the arm 163 to suddenly retract the ejector-rod 152, the arm 163 contacting with the buffer-spring 167. To prevent excessive rearward movement of the rod 152 and arm 163, a stop-screw 183, having a suitable set-nut, is tapped through one of the bearings 159, as shown in Fig. 1, to limit the rearward movement of said arm 163.

To guide the arm 170 in its movements and obstruct any tendency to rocking on the slide-rod 90, the upper bent portion thereof extends under a guide strip or bar 177, secured to the top of the machine or to a plate 178 secured thereon, as shown in Figs. 1, 2, and 8, said bar being omitted in Fig. 7 to avoid confusion.

Each shell as it is ejected from the clutch is deposited in a chute 179 and from thence into another chute 180 and to any suitable receptacle. (Not shown.)

The operation of the several parts and groups of parts having been stated above in connection with the description of their construction, further reference to the operation of the machine as a whole is deemed unnecessary further than to emphasize the fact that the advancing movements of all parts of the mechanism which act on the shells in locations where they might possibly become jammed, owing to some imperfection in a shell fed to the machine, are through springs which will yield if a shell should catch, and therefore there is no possibility of any breaking accident to any part of the machine. It should be stated, however, that the said yielding advancing movement of the part which inserts the shells in the chuck is largely instrumental in insuring the accurate location of each shell in the chuck preparatory to its being acted upon by the cutter. As has been stated, the presser-rod 88 pushes the shell into the chuck with a yielding pressure. The spring 98 is much stronger than the spring 156 in the ejector, and therefore when the end of a shell comes in contact with the head 155 of the ejector the latter yields to the full extent required by the advancing movement of the rod 88 and according to the length of the particular lot of shells being operated upon. It is only essential, therefore, in order to insure accuracy in the operations of the cutter in this machine, that the rod 88 shall always advance to and only to a certain fixed point, so that the end of said rod which acts on the head of the shell or the bottom of its primer-pocket shall push the shell to its exact longitudinal position. This is accomplished by a stop-screw 181, (see Fig. 1[a],) tapped through the bearing 89 and held in its adjusted position by means of a set-nut 182, said stop-screw serving to limit the position to which the stop 99, and consequently the presser-rod 88, can

be advanced by the spring 98, through which and arm 97 the slide-rod acts.

The accuracy of the work of the tool relatively to the axis of the shell or chuck is determined, as has been stated, by the stop-screw 142, (see Fig. 6,) against which the tool-carriage 139 is carefully adjusted by means of the bolt 150 and screw 151 prior to starting the machine and while the roll 147 of the lever-arm 146 is in the part of the cam-groove 148 having the longest radii.

Having thus described my invention, I claim—

1. A machine of the character described, comprising a lathe-chuck, a stationary shell-receiver out of alinement with the chuck, a transferrer movable between points in line with the receiver and chuck, and means for pushing the shell in the direction of its length from the receiver to the transferrer and from the transferrer to the chuck.

2. A machine of the character described, comprising a lathe-chuck, a stationary shell-receiver out of alinement with the chuck, a transferrer movable between points in line with the receiver and chuck, and means for pushing the shell in the direction of its length from the receiver to the transferrer and from the transferrer to the chuck, said means including spring connections for yieldingly pushing the shell.

3. A machine of the character described, comprising a lathe-chuck, a stationary shell-receiver out of alinement with the chuck, a transferrer movable between points in line with the receiver and chuck, means for pushing the shell in the direction of its length from the receiver to the transferrer and from the latter to the chuck, and an ejector for expelling the shell from the chuck.

4. A machine of the character described, comprising a lathe-chuck, a stationary shell-receiver out of alinement with the chuck, a transferrer movable between points in line with the receiver and chuck, means including springs for pushing the shell in the direction of its length from the receiver to the transferrer and from the latter to the chuck, and an ejector for expelling the shell from the chuck.

5. A machine of the character described, comprising an assembling-table, a chute leading therefrom, a stationary shell-receiver at the lower end of the chute, a transferrer movable past the receiver, a chuck in line with the forward position of the transferrer, and means for pushing the shell in the direction of its length from the receiver to the transferrer and from the latter to the chuck.

6. A machine of the character described, comprising an assembling-table, a chute leading therefrom, a stationary shell-receiver at the lower end of the chute, a transferrer movable past the receiver, a chuck in line with the forward position of the transferrer, means for pushing the shell in the direction of its length from the receiver to the transferrer and from the latter to the chuck, and an ejector for expelling the shell from the chuck.

7. A machine of the character described, comprising an assembling-table, a chute leading therefrom, a stationary shell-receiver at the lower end of the chute, a transferrer movable past the receiver, a chuck in line with the forward position of the transferrer, means for yieldingly pushing the shell in the direction of its length from the receiver to the transferrer and from the latter to the chuck, an ejector for expelling the shell from the chuck, and a chute for receiving the shells from the chuck.

8. A machine of the character described, comprising a lathe-chuck, a shell-receiver out of alinement but parallel therewith, a transferrer movable between points in line with the receiver and chuck, means for pushing the shell in the direction of its length from the receiver to the transferrer and from the latter to the chuck, a cam-shaft having a plurality of cams, and connections including springs between the cams and the shell-shifting parts.

9. A machine of the character described, comprising a lathe-chuck, a shell-receiver, a transferrer movable between points in line with the receiver and chuck, said transferrer being composed of two pairs of spring-jaws each pair adapted to yield independently of the other, and means for pushing the shell from the receiver to the transferrer and from the latter to the chuck.

10. A machine of the character described, comprising a lathe-chuck, a shell-receiver, a transferrer movable between points in line with the receiver and chuck, said transferrer being composed of two pairs of spring-jaws each pair having its edges curved or beveled on one side, and means for pushing the shell from the receiver to the transferrer and from the latter to the chuck.

11. A machine of the character described, comprising a lathe-chuck having a hollow spindle, means for automatically supplying shells successively to the chuck, and a yielding or elastic ejector within the spindle and comprising two parts and an intermediate spring, and means for positively moving the rear part of said ejector to cause the front part to exert a yielding pressure against each shell to eject it.

12. A machine of the character described, comprising a lathe-chuck having a hollow spindle, means for automatically supplying shells successively to the chuck, an ejector within the spindle, a reciprocating striker or finger, a latch connected with the ejector and located in the path of movement of said finger, and a trip device for automatically releasing the latch from said finger.

13. The combination with the table 29, of the chute 36 leading therefrom, the receiver 43 at the lower end of the chute, the rock-

shaft 46 having the arm 45 carrying the finger 44 at its end, the curve of said finger being eccentric to its path of oscillation, the arm 48 connected with said rock-shaft and having the roll 49, the cam 50 on the cam-shaft, the spring 51 connected with the arm 48 and operating to hold the roll in engagement with the cam and to project the finger 44 across the receiver, and means for pushing the shells from the receiver in the direction of their length.

14. The combination with the table 29, of the chute 36, the stationary receiver 43, the push-rod 53 mounted in suitable bearings and having a pin or roll 56, the lever 57 having a roll 59 at its lower end and connected at its upper end to the pin or roll 56, the cam 60, and the spring 61 connected with the lever and adapted to advance the push-rod when permitted to do so by the cam 60.

15. The combination with the table 29, of the chute 36, the receiver 43, the push-rod 53 mounted in suitable bearings and having a pin or roll 56, the lever 57 having a roll 59 at its lower end and connected at its upper end to the pin or roll 56, the cam 60, the spring 61 connected with the lever and adapted to advance the push-rod when permitted to do so by the cam 60, and an adjustable stop 62 for limiting the movement imparted by said spring.

16. The combination with the block 66 and means for reciprocating it, of the upper and lower spring-jaws 64 and 65 secured to said block, said jaws forming two pairs of spring-clamps side by side adapted to operate upon a shell independently of each other.

17. The combination with the block 66 and means for reciprocating it, of the upper and lower spring-jaws 64 and 65 secured to said block, reciprocating rods adapted to pass between the jaws at each limit of travel of the latter, means for supplying shells to be pushed between the jaws by one rod, and a chuck to receive shells pushed from the jaws by the other rod.

18. The combination with the block 66 and means for reciprocating it, of the upper and lower spring-jaws 64 and 65 secured to said block, sliding rods adapted to pass between the jaws at each limit of travel of the latter, springs for advancing the rods and cams for retracting them, means for supplying shells to be pushed between the jaws by one rod, and a chuck to receive shells pushed from the jaws by the other rod.

19. The combination with the block 66 and means for reciprocating it, of the upper and lower spring-jaws 64 and 65 secured to said block side by side, and adjustable stops for varying the normal space between said jaws.

20. The combination with the block 66 and means for reciprocating it, of the upper and lower spring-jaws 64 and 65 secured to said block side by side, and the adjustable screws 68 projecting from the upper and lower sides of the block and adjustable therein for varying the normal space between said jaws.

21. The combination with the block 66 and means for reciprocating it, of the two upper and lower spring-jaws 64 and 65 secured to said block, and having their edges beveled or curved on one side.

22. The combination with the two pairs of spring transferrer-jaws, of the plate or slide 70 supporting said jaws and having rack-teeth 74, the shaft 76 having a pinion 75 engaging the teeth 74 and having also a pinion 78, the toothed segment 79 pivotally supported by the frame of the machine, and meshing with said pinion 78, and means for oscillating the toothed segment.

23. The combination with the two pairs of spring transferrer-jaws, of the plate or slide 70 supporting said jaws and having rack-teeth 74, the shaft 76 having a pinion 75 engaging the teeth 74 and having also a pinion 78, the toothed segment 79 meshing with the pinion 78 and pivotally supported by the frame of the machine and having a roll 81, the cam 82, and the spring 83 for holding the roll in engagement with the cam and advancing the transferrer-jaws.

24. The combination with the two pairs of spring transferrer-jaws, of the plate or slide 70 supporting said jaws and having rack-teeth 74, the shaft 76 having a pinion 75 engaging the teeth 74 and having also a pinion 78, the toothed segment 79 meshing with the pinion 78 and pivotally supported by the frame of the machine and having a roll 81, the cam 82, the spring 83 for holding the roll in engagement with the cam and advancing the transferrer-jaws, and the adjustable stop 86 for limiting the movement of the segment in one direction.

25. The combination with the chuck and means for rotating it, of the presser-rod 88 mounted to reciprocate toward and from the chuck and having the stop 99 and the groove 100, the slide-rod 90 and means for reciprocating it, the arm 97 connected with the slide-rod and having a gib 101 entering the groove in the presser-rod, and the spring 98 between the arm 97 and the stop 99.

26. The combination with the chuck and means for rotating it, of the presser-rod 88 mounted to reciprocate toward and from the chuck and having the stop 99 and the groove 100, the slide-rod 90 mounted to reciprocate in bearings 91 and having the arm 92 provided with a pin or roll, the cam-shaft having a hub 95 provided with a cam-groove 94 receiving the pin or roll on the end of the arm 92, the guide strip or bar 96 for preventing the disengagement of the arm 92 from the cam, the arm 97 connected with the end of the slide-rod and having a gib 101 entering the groove 100 in the presser-rod, and the spring 98 between the arm 97 and the stop 99.

27. The combination with the chuck and means for rotating it, of the slide-rod 90 and

means for reciprocating it, the presser-rod 88 in line with the chuck and having connections with the rod 90, and an ejector permanently located within the chuck and also having connections with the rod 90.

28. The combination with the chuck and means for rotating it, of the slide-rod 90 and means for reciprocating it, the presser-rod 88 in line with the chuck and having connections with the rod 90, and an ejector permanently located within the chuck and also having connections with the rod 90, the connections from the rod 90 to the rod 88 and the ejector including springs to impart yielding advancing movements to the said rod 88 and the ejector.

29. The combination with the chuck and means for rotating it, of the slide-rod 90 and means for reciprocating it, the presser-rod 88 in line with the chuck and having connections with the rod 90, an ejector within the chuck and also having connections with the rod 90, the connections between the rod 90 and the rod 88 including an arm projecting from the former and sliding on the latter, and a spring interposed between said arm and a stop or collar on the rod 88, and the connections between the rod 90 and the ejector also including a spring for imparting a yielding advance to the ejector.

30. The combination with the chuck-jaws and the hollow spindle 106, of the sleeve 113 for operating the jaws, the ejector-rod 152 movable within the sleeve 113, a yielding ejector also within the sleeve and adapted to be reciprocated by the rod 152, and means for reciprocating said rod independently of the sleeve.

31. The combination with the chuck-jaws and the hollow spindle 106, of the sleeve 113 for operating the jaws, the ejector-rod 152 movable within the sleeve 113, the ejector-barrel 154 in said sleeve and containing a spring 156 and the ejector-pin 155, means for limiting the movement of the pin in the barrel, and means for reciprocating the rod 152.

32. The combination with the chuck-jaws and the hollow spindle 106, of the sleeve 113 for operating the jaws, the ejector-rod 152 movable within the sleeve 113, the ejector-barrel 154 in said sleeve and containing a spring 156, the slotted ejector-pin 155 carried by said barrel, the pin 157 extending through the slot of the pin and into the barrel, and means for reciprocating the rod 152.

33. The combination with the hollow chuck-spindle and the ejector contained therein, of the rod 152 having the annular groove 162, the slide-rod 158 having the cap 160 provided with a slot the walls of which engage said groove 162, and means for reciprocating the slide-rod 158 and through the coupling described the rod 152 and the ejector.

34. The combination with the hollow chuck-spindle 106 having slots 112 at its rear end, of chuck-jaws and a sleeve for operating them, levers 115 for operating the sleeve and having their short ends projecting through said slots, the bushing 120 fitted in the end of the spindle 106, the clamp-nut 118 secured on the end of the said spindle, and an ejector-rod passing through said bushing and sleeve.

35. The combination with the hollow spindle 106 having slots 112, of the sleeve 113 having lugs extending into said slots, the collar 117 having the levers 115 pivoted thereto and having their short arms extending into said slots, means for holding the collar 117 in place, the cone-sleeve 121 mounted to slide on the spindle 106, means for sliding said cone-sleeve, and the ejector-rod 152 and an ejector operated thereby extending through the sleeve 113.

36. The combination with the chuck and the shell-ejector, of the rod 152, the slide-rod 158 connected thereto and having the arm 163 secured thereto, the latch-hook 164 carried by the arm 163, the slide-rod 90 having an arm provided with a finger adapted to engage the hook 164, and means for reciprocating the rod 90.

37. The combination with the chuck and the shell-ejector, of the rod 152, the slide-rod 158 connected thereto and having the arm 163, the latch-hook 164 pivoted to the arm 163, the slide-rod 90 having an arm provided with a finger adapted to engage the hook 164, the spring 166 for yieldingly holding the hook in position to be engaged by said finger, the block 171 having an inclined top 172, and the springs 168 and 167 on the rod 158 each side of the arm 163.

38. A machine for turning the heads of cartridge-shells comprising the assembling-table 29, a chute leading therefrom, a shell-receiver at the bottom of the chute, the double transferrer 64, 65 movable past the receiver, the push-rod 53 and means for reciprocating it through the receiver toward the transferrer, the lathe-chuck, the presser-rod 88 and means for projecting it between the jaws of the transferrer when the latter is in front of the chuck, and an ejector within the chuck.

39. A machine for turning the heads of cartridge-shells comprising the assembling-table 29, a chute leading therefrom, a shell-receiver at the bottom of the chute, a shell-lifter movable toward and from the chute above the shell in the receiver, the double transferrer 64, 65 movable past the receiver, the push-rod 53 and means for reciprocating it through the receiver toward the transferrer, the lathe-chuck, the presser-rod 88 and means for projecting it between the jaws of the transferrer when the latter is in front of the chuck, and a spring-operated ejector within the chuck.

40. A machine for turning the heads of cartridge-shells, comprising the assembling-table 29, a chute leading therefrom, a shell-receiver at the bottom of the chute, a shell-lifter movable toward and from the chute above the

shell in the receiver, the double transferrer 64, 65 movable past the receiver, the push-rod 53 and means including a spring for imparting a yielding movement thereto through the receiver toward the transferrer, the lathe-chuck, the presser-rod 88 and means including a spring for yieldingly projecting it between the jaws of the transferrer when the latter is in front of the chuck, and a spring-operated ejector within the chuck.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES R. RICHARDS.

Witnesses:
A. M. WOOSTER,
N. ELWOOD.