

(No Model.)

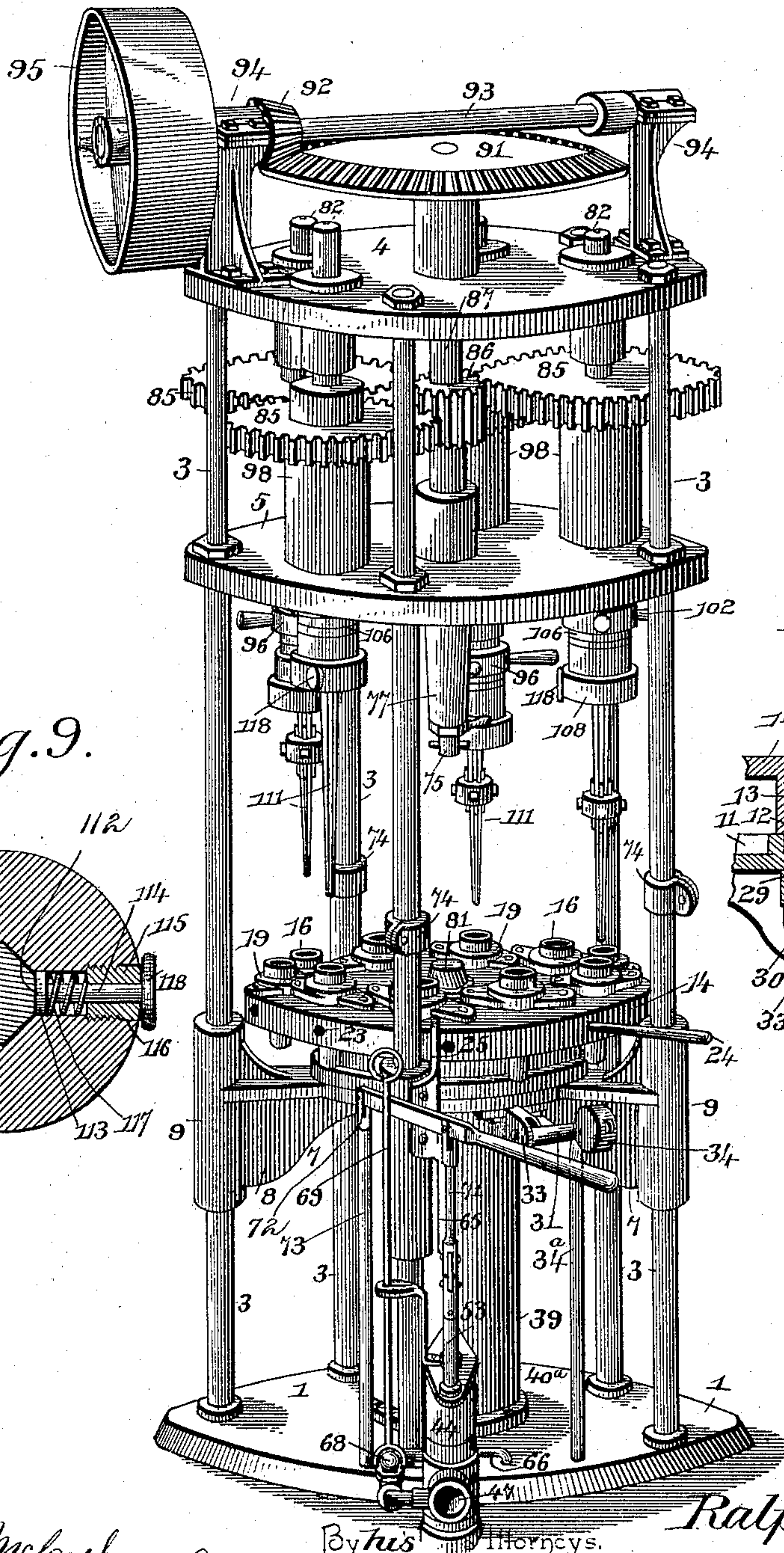
3 Sheets—Sheet 1.

R. R. SPEARS.  
MACHINE FOR REAMING AXLE BOXES.

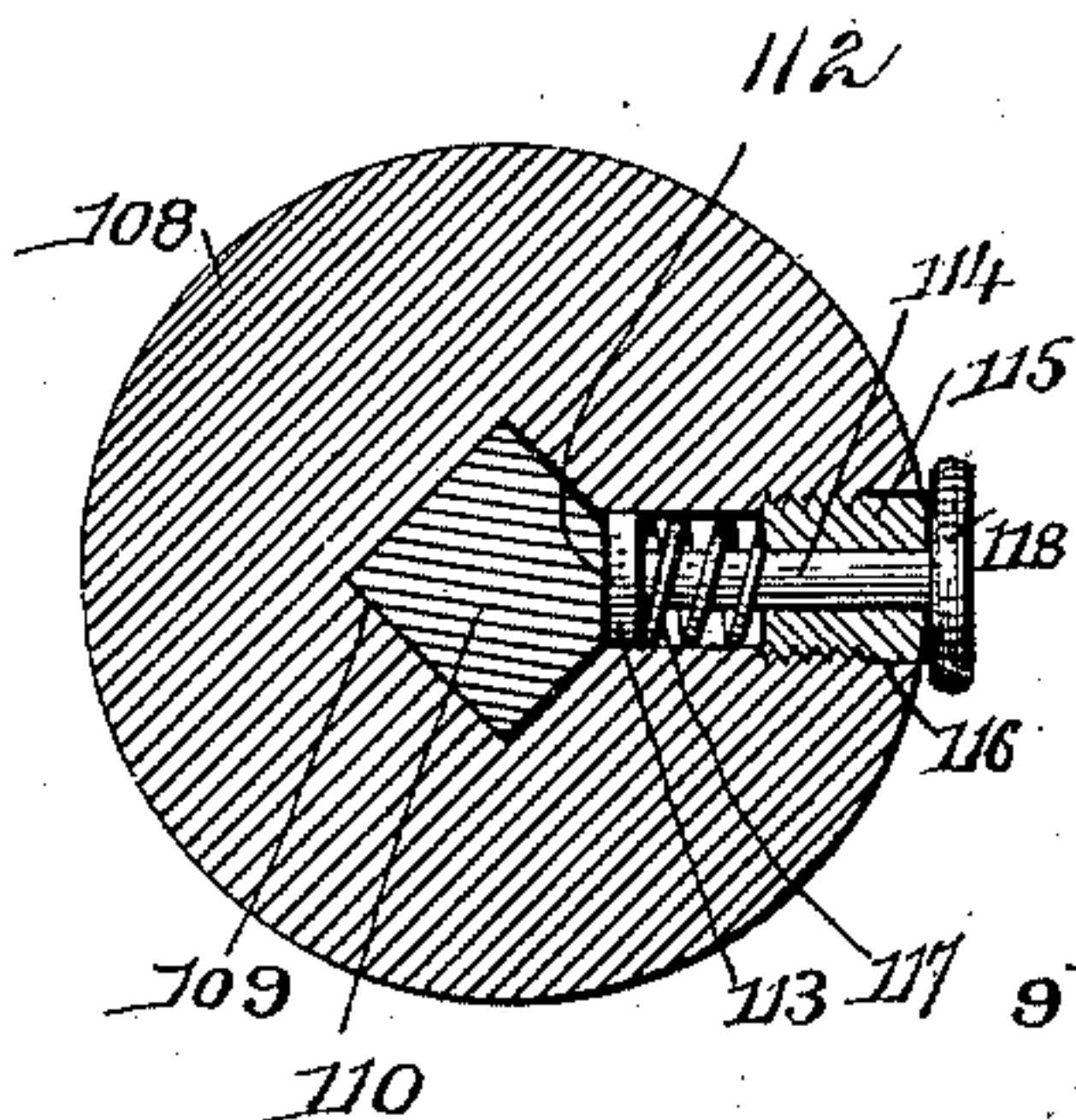
No. 585,715.

Patented July 6, 1897.

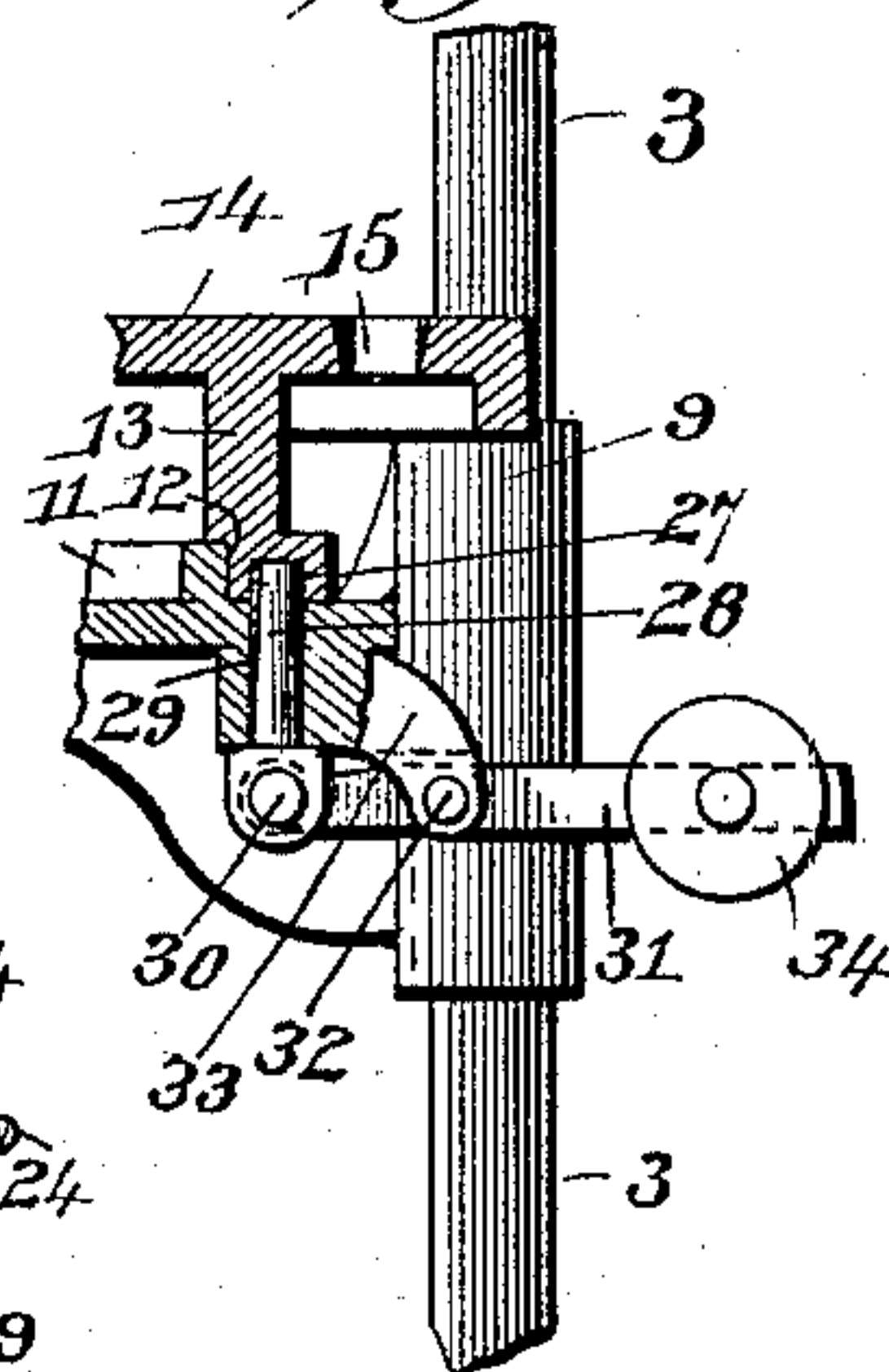
*Fig. 1.*



*Fig. 9.*



*Fig. 7.*



Inventor

Ralph R. Spears

By this my Attorneys.

Witnesses

James L. McLaughlin  
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(No Model.)

3 Sheets—Sheet 2.

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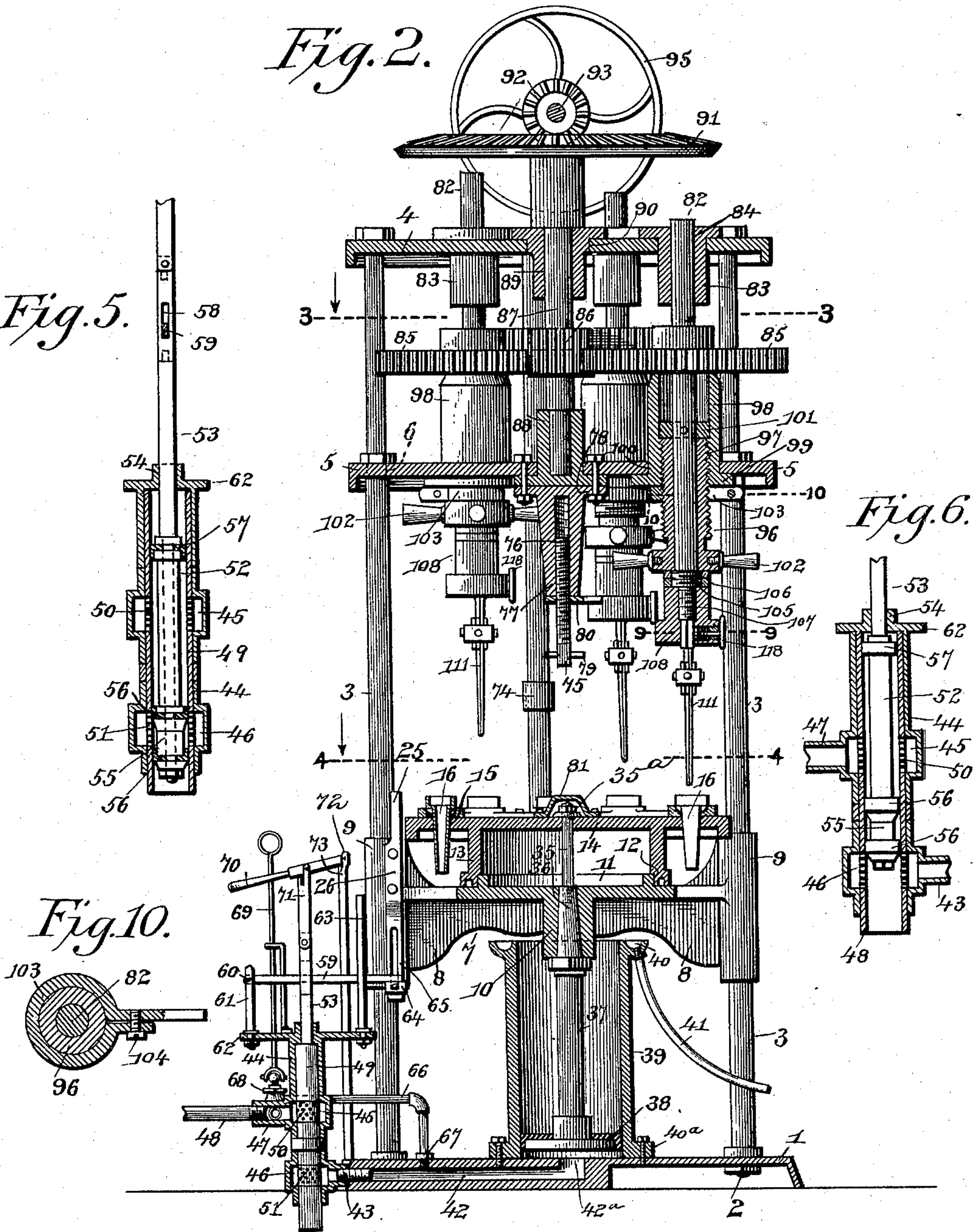
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*Fig. 2.*

*Fig. 5.*

*Fig. 6.*

*Fig. 10.*



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(No Model.)

3 Sheets—Sheet 3.

R. R. SPEARS.  
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Fig. 3.

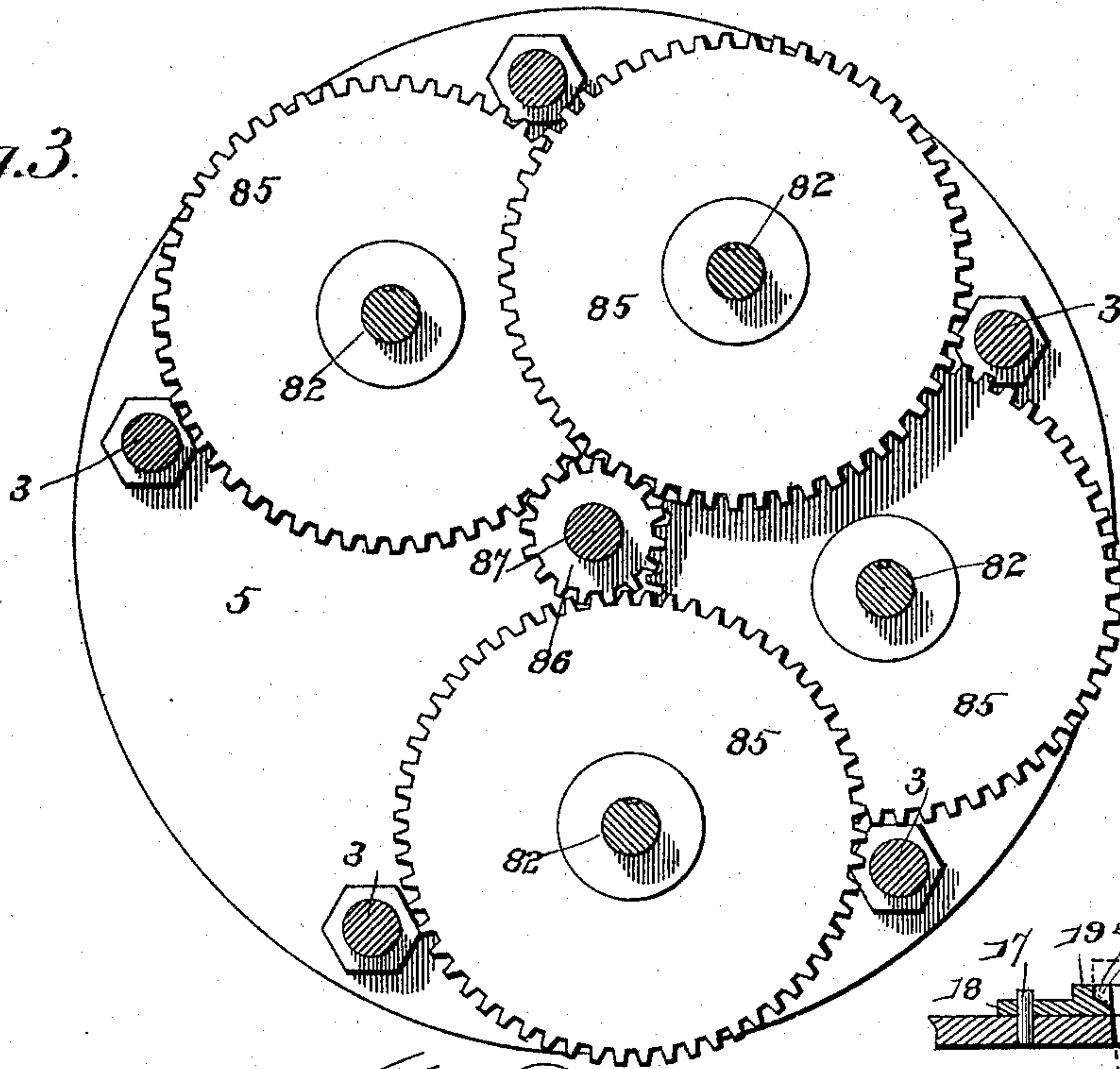


Fig. 8.

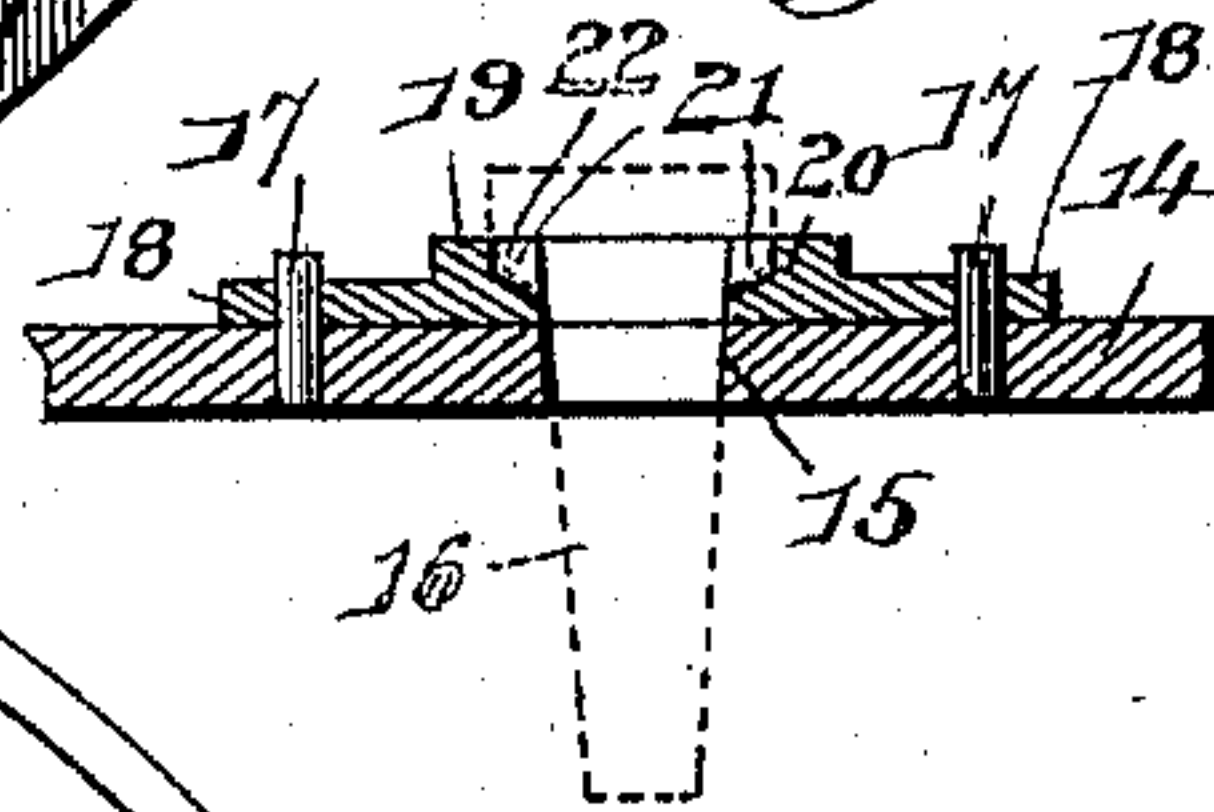
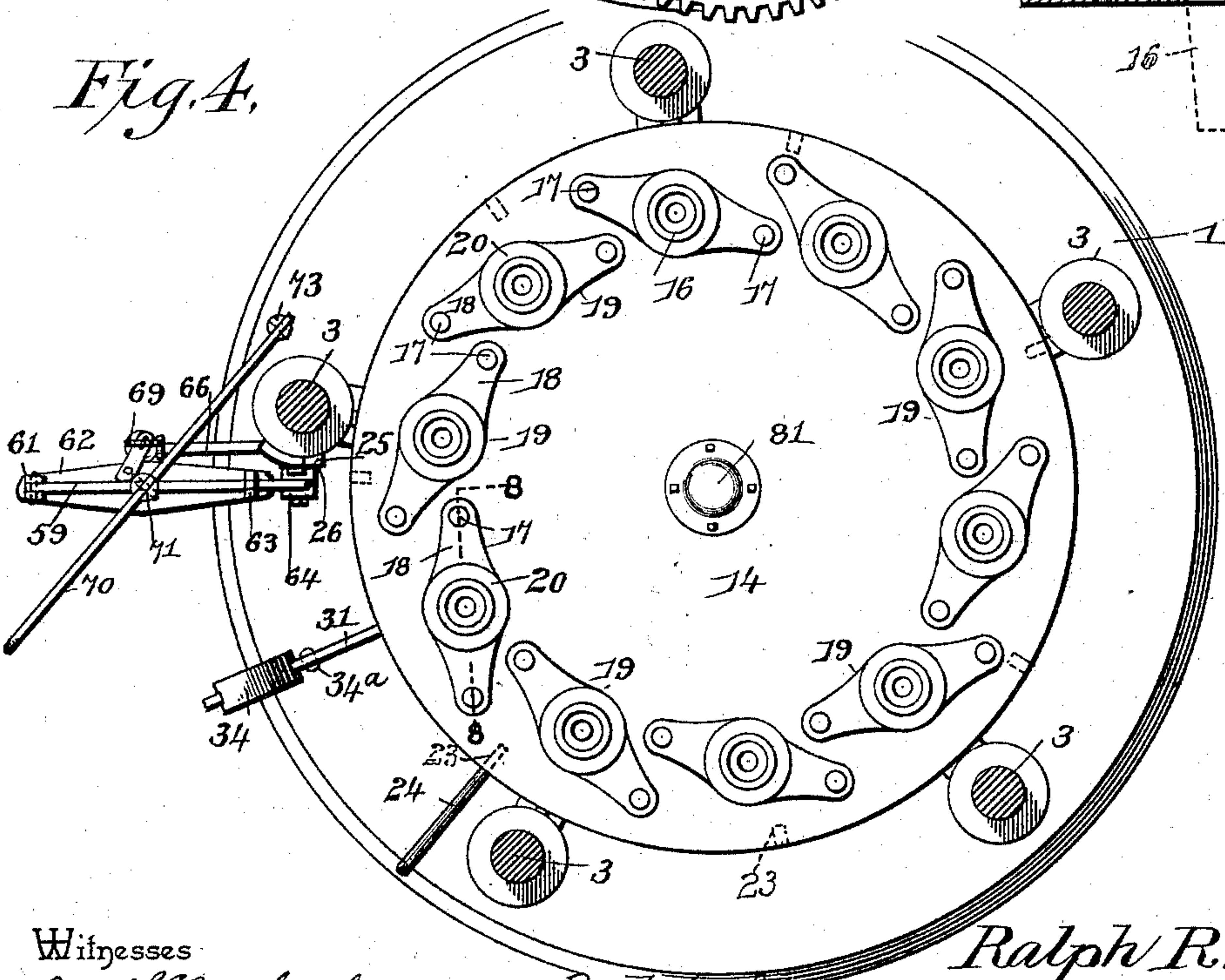


Fig. 4.



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# UNITED STATES PATENT OFFICE.

RALPH REED SPEARS, OF WHEELING, WEST VIRGINIA.

## MACHINE FOR REAMING AXLE-BOXES.

SPECIFICATION forming part of Letters Patent No. 585,715, dated July 6, 1897.

Application filed October 3, 1896. Serial No. 607,784. (No model.)

*To all whom it may concern:*

Be it known that I, RALPH REED SPEARS, a citizen of the United States, residing at Wheeling, in the county of Ohio and State of West Virginia, have invented a new and useful Machine for Reaming Axle-Boxes, of which the following is a specification.

This invention relates to machines for reaming axle-boxes; and it has for its object to provide a new and useful machine of this character having simple and efficient means for completely reaming axle-boxes with but one handling, and in the accomplishment of this important result contemplates improved devices for supporting the axle-boxes and for feeding the same to the reaming-tools in such a manner as to insure very accurate work.

Heretofore the work of reaming axle-boxes has usually required the handling of each box four different times, as all axle-boxes generally require the use of four reamers of different sizes and shapes to finish the interior thereof. This delay and other objections incident to carrying out the ordinary method of reaming axle-boxes is entirely obviated by the use of the machine disclosed in this application.

With these and other objects in view, which will readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination, and arrangement of parts hereinafter more fully described, illustrated, and claimed.

In the drawings, Figure 1 is a perspective view of a reaming-machine constructed in accordance with this invention. Fig. 2 is a central vertical sectional view of the machine. Fig. 3 is a cross-sectional view on the line 3 3 of Fig. 2. Fig. 4 is a similar view on the line 4 4 of Fig. 2. Fig. 5 is a detail vertical sectional view of the automatic feed-valve device, showing the plunger-valve raised to cut off the flow of water from the cylinder. Fig. 6 is a view similar to Fig. 5, showing the plunger-valve elevated to the position for allowing the water to discharge from the cylinder to permit the holder-table to drop. Fig. 7 is an enlarged detail sectional view at one edge of the holder-table, showing the gravity-lock device for locking the table to the spider supporting-frame. Fig. 8 is a detail sectional view on the line 8 8 of Fig. 4. Fig. 9 is a similar view on the line 9 9 of Fig. 2. Fig. 10 is a similar view on the line 10 10 of Fig. 2.

Referring to the accompanying drawings, the numeral 1 designates a base or bed plate supporting the entire machine and resting on the floor where the same is used, and said base or bed plate 1 has bolted or otherwise suitably fitted thereto near its periphery the lower bolt ends 2 of a circular series of upright frame-rods 3, extending the full height of the machine and having their upper ends bolted to the circular top or crown plate 4, below and parallel with which is arranged an intermediate supporting-plate 5, a duplicate in construction of the top or crown plate 4 and provided near its periphery with a series of rod-openings 6, receiving the upright frame-rods 3, to which rods the supporting-plate 5 is clamped in any suitable manner, said supporting-plate 5 and the top or crown plate 4 jointly providing for the support of the reaming-tools and their driving mechanism, as will be hereinafter more particularly explained.

Arranged to work within the circle of the upright frame-rods 3, below the plane of the intermediate supporting-plate 5 of the machine frame or stand, is a vertically-movable spider table-support 7, having a plurality of radially-extending spider-arms 8, formed at their outer ends with elongated vertically-disposed slide-sleeves 9, slidably receiving the upright frame-rods 3 and adapted to slide thereon a distance equaling the full limit of movement of the table-support. The said vertically-movable table-support 7 is provided with a central interiorly-tapered collar 10, projecting therebelow, and upon its upper side with an annular or circular guide-rib 11, fitting the lower inner grooved edge 12 of the depending circular bearing-flange 13, projected from the underside of the rotatable holder-table 14, which forms a support for the axle-boxes to be reamed. The rotatable holder-table is of a greater diameter than its depending bearing-flange 13 and is provided near its periphery with a circular series of tapered openings 15, adapted to receive therein the axle-boxes 16 to be reamed, and said table 14 is further provided at diagonally opposite sides of each axle-box opening 15 therein with the short upwardly-projecting securing pins or studs 17, adapted to receive the perforated ears 18 of the separate detachable holder-plates 19, placed flat on top of the table 14, over each axle-box opening therein, and arranged diagonally, so as to overlap each



other at their ends and thereby permit the requisite number of axle-boxes to be placed on the table to carry out the operation of the machine.

5 The holder-plates 19 are provided centrally between their ends with the collars 20, having their openings alined with the table-openings 15 therebelow, so as to receive the spindle portions of the axle-boxes 16 therein, and the collars 20 of the holder-plates are provided at diametrically opposite sides of the openings therein with the notches 21, adapted to receive therein the diametrically opposite lugs 22, formed on the axle-boxes at the flared end thereof, said engagement of the lugs 22 with the notches 21 of the holder-plates serving to secure the axle-boxes rigid in their upright positions and small ends disposed downward, so as to prevent the same from turning while the reaming-tools are rotated therein.

At times during the operation of the machine it is necessary to rotate the holder-table 14, and to provide for this the said table is provided in its periphery with a series of sockets 23, adapted to detachably receive the inner end of a handle-bar 24, which by being inserted in the different notches 23 and swung between a pair of the upright frame-rods 3 will provide for rotating the table on its support 7 to bring the axle-boxes into the desired position, and in thus rotating the table the rotary movement thereof is positively limited by means of an upwardly-disposed stop-arm 25, projected from a plate 26, attached to and carried by one of the slide-sleeves 9 of the spider-table-supports 7. After having rotated the table to the position desired it is necessary to lock the same against turning while being elevated to carry the axle-boxes over the reaming-tool, and to provide for thus locking the table the latter is provided in the lower edge of its depending bearing-flange 13 with a circular series of pin-openings 27, adapted to receive therein the upper end of a vertically-movable locking-pin 28, working through a guide-opening 29, formed in the table-support 7 near one of its sleeves 9. The locking-pin 28 is pivotally connected at its lower end, as at 30, to the inner end of a gravity weight-lever 31, pivotally mounted intermediate of its ends, as at 32, in a bifurcated pivot-lug 33, projected from one side of the spider table-support, and said gravity weight-lever 31 carries on its outer end a weight 34, which normally projects the pin 28 upward, so as to engage in one of the openings 27 when it comes in alinement therewith. When the table drops to its lowest position and is ready for adjustment by rotation in the manner described, the outer weighted end of the lever 31 comes in contact with the upper end of a fixed strike rod or post 34<sup>a</sup>, arising from the base or bed plate 1, to provide means for automatically withdrawing the pin 28 from its locking engagement with the table 14. When the table 14 rises to carry the axle-boxes onto

the reaming-tools, the weighted end of the lever 31 drops to a normal position and locks the table against rotation during its upward movement.

The holder-table 14 is held in position on the spider-table-support 7 by means of a pivot-bolt 35, the upper end of which is bolted, as at 35<sup>a</sup>, in a central pivot-opening formed in the table, and the lower end of said bolt 35 is threaded in a socket formed in the upper end of the tapered stem 36, fitted tightly in the tapered opening of the depending collar 10 of the table-support 7. The tapered stem 36 is formed at one end of a piston-rod 37, carrying at its lower end a suitably-packed piston-head 38, snugly working in an upright hydraulic cylinder 39. The upright hydraulic cylinder 39 is open at both ends, and is provided at its lower end with an annular flange 40<sup>a</sup>, bolted or otherwise suitably fastened on top of the base or bed plate of the machine, and at its upper open end the cylinder is surrounded by an annular overflow-gutter 40, with which communicates a drain-pipe 41 to provide means for carrying off any overflow of liquid that may escape over the upper edge of the cylinder into the gutter 40.

The base or bed plate 1 of the machine has formed therein a water-passage 42, communicating at its inner end, as at 42<sup>a</sup>, with the lower end of the cylinder 39, below the piston-head 38, and at its outer end the water-passage 42 in the base-plate has a nipple connection 43 with one side of an upright valve-casing 44, near the lower open end of such casing. The upright valve-casing 44 is formed with separate upper and lower enlarged annular inlet and discharge chambers 45 and 46, respectively, the lower discharge-chamber 46 being disposed directly above the lower open discharging end of the casing and communicating, with the nipple connection 43, with the water-passage 42, while the upper inlet-chamber 45 has a pipe-neck connection 47 with the pressure-supply pipe 48, leading, preferably, to a city water-main or other source of water-supply under pressure. In connection with the upper and lower chambers 45 and 46 of the valve-casing is employed an inner plunger-cylinder 49, closely fitting the interior of the valve-casing and provided with separate upper and lower perforate portions 50 and 51, communicating, respectively, with the inlet and discharge chambers 45 and 46 of the valve-casing, and arranged to work within the inner cylinder 49 of the valve-casing is an elongated plunger-valve 52, fitted on the valve-stem 53, working through a stuffing-box 54 at the upper closed end of the valve-casing. The elongated cylindrical plunger-valve 52 is provided at its lower end with a valve-head 55, having spaced packing-disks 56, designed to control the flow of water in either direction through the lower perforate portion 51 of the cylinder or tube 49, and at its upper end the valve 52 is provided with a packing-head 57, working above the upper perforate portion 50 of the



tube 49 and serving to pack the upper portion of the valve-casing to prevent the escape of water in that direction.

The valve-stem 53 has formed therein above the valve-casing 44 a vertically-disposed slot 58, receiving therein a lifting-lever 59, pivotally supported at one end, as at 60, on a bracket-arm 61, arising from a plate 62 at the upper end of the valve-casing 44. At the side of the valve-stem 53, opposite its pivotal support, the lever 59 works in a vertically-slotted guide-standard 63, projected upwardly from the plate 62, and the free end of the said lever 59 is disposed above an adjusting-block 64, adjustably secured to the vertically-slotted arm 65 of the plate 26.

With the holder-table and its spider supporting-frame at their lower limit of movement and the piston-head 38 at the end of its downstroke the plunger-valve 52 is adjusted downward to carry its valve-head 55 below the plane of the perforations 51, thereby cutting off the lower open end of the valve-casing from any discharge of water and opening up communication between the two chambers 45 and 46 of the valve-casing. The water or other liquid then has a free passage from the pressure-supply pipe 48 into the upper inlet-chamber 45, through the perforations 50 into the cylinder 49, through the perforations 51 into the lower discharge-chamber 46, and then through the water-passage 42 of the base-plate into the lower end of the cylinder 39 into the piston-head. The water or other liquid under pressure continues to flow through the channels referred to into the cylinder and forces the piston-head 38 upward, thereby providing for the quick elevation of the holder-table to the point where the reaming-tools begin to cut in the axle-boxes. The table rises very rapidly under the full pressure of the water passing through the pipe 38 until it reaches the point referred to, and by this time the block 64 will have carried the lifting-lever 59 to a position for adjusting the plunger-valve 52 to the position illustrated in Fig. 5 of the drawings, in which the valve-head 52 entirely covers the lower perforate portion 51 of the casing-cylinder 49, and thereby cuts off a further flow of water from the pipe 48 into the cylinder. With the plunger-valve positioned as described the water holds the table in its elevated position at the point where the reaming-tools begin to cut, and it is then necessary to complete the upward feeding of the table at a much slower rate of speed, to accomplish which is employed a small by-pass feed-pipe 66.

The by-pass feed-pipe 66 communicates at one end with the pressure-supply pipe 48 and at its other end, as at 67, with the water-passage 42 in the base of the machine, and at a suitable point between its ends the pipe 66 is provided with a cut-off valve 68, having a handle-rod connection 69 with its stem, so that the passage of water through the pipe 66 can be readily controlled. The pipe 66 is of

a materially smaller gage or diameter than the supply-pipe 48, so that when the holder-table reaches the position noted and the flow of water through the valve-casing is cut off the opening of the valve 68 will permit a reduced flow of water to pass through the pipe 66 and into the cylinder, thereby providing means for slowly feeding the table upward while the reaming-tools are boring therein.

After the holder-table is fed upward to its extreme limit of movement the plunger-valve 52 is pulled upward, after closing the valve 68, by means of a hand-lever 70, having a link connection 71 with the upper end of the valve-stem 53 and pivotally mounted in the upper bifurcated end 72 of a standard 73, arising from the base or bed plate of the machine. By grasping the hand-lever 70 and moving the same upward the valve-head 55 is carried above the line of perforations 51, thereby opening up communication between the lower discharge-chamber 46 and the lower open end of the valve-casing to permit the water to discharge from the cylinder, so as to allow the holder-table and its support to drop to their lower limits of movement. When the table is ready to again move upward, the plunger valve 52 is adjusted to a position to again open up communication between the pressure-supply pipe and the cylinder, as will be readily understood.

The upward movement of the holder-table for the axle-boxes is limited by means of adjustable stop-collars 74, adjustably fitted on the upright frame-rods 3 and engaged by the slide-sleeves 9 of the spider table-support, and also by means of a centrally-arranged stop-screw 75, adjustably working in the threaded socket 76 of a depending post 77, provided with a flanged upper end 78, bolted centrally to the intermediate supporting-plate 5 of the machine-frame. The central stop-screw is provided at its lower end with a cross adjusting-pin 79 and has mounted thereon a jam-nut 80, working against the lower end of the post 77 to secure the screw fast in its adjusted position. The lower end of said screw is adapted to be engaged by a strike-cap 81, fitted centrally to the upper side of the table 14, over the upper end 35<sup>a</sup> of the pivot-bolt 35. By means of the central stop-screw 75 and the stop-collars 74 the spider table-support 7 and the holder-table are positively stopped at the proper point without undue vibration in order to insure accurate reaming, as will be appreciated by those skilled in the art.

Arranged to work above the vertically-movable rotatable holder-table is a plurality of tool-spindles 82, designed to rotate in unison for the purpose of working on four axle-boxes at one time, it being understood that the machine employs four reaming-tools. Each of the tool-spindles 82 is disposed in a vertical plane and turns at its upper end in a flanged bearing-bushing 83, secured in a bushing-opening 84, formed in the top or crown plate



4 of the machine frame or stand, there being a circular series of the openings 84 and the bushings 83 to provide for the bearing-support of the upper ends of the entire series of tool-spindles, and said tool-spindles have feathered thereon below the bearing-bushings 83 for the upper ends thereof the horizontal spur-gears 85, meshing with a wide drive-pinion 86, arranged centrally between the circular group of gears 85 and fitted on a short upright drive-shaft 87, stepped at its lower end in the bearing-step 88.

The bearing-step 88 is preferably arranged to project upwardly through a central opening in the intermediate supporting-plate 5 and is provided with a flanged lower end clamped to the plate 5 by the same bolts which secure the post 77 in position. The upper end of the short vertical drive-shaft 87 extends through a centrally-arranged flanged bearing-bushing 89, fitted in a central bushing-opening 90, formed in the top or crown plate 4. Above the central bearing-bushing 89 for the drive-shaft 87 the latter has keyed thereon a horizontal beveled gear crown-wheel 91, meshing with a beveled gear-pinion 92, fitted on the main drive-shaft 93, arranged transversely above the top of the machine frame or stand over the horizontal crown-wheel 91 and journaled in the bearing-uprights 94, arising from the top or crown plate 4 at diametrically opposite edges thereof, and the said main transverse drive-shaft 93 has mounted on one end thereof the belt-pulley 95 for receiving the belt from the engine or other suitable motive power employed for operating the reaming-machine.

Each of the tool-spindles 82 is vertically movable by reason of the feathering of the spur-gears 85 thereon and is of a sufficient length to extend below the plane of the intermediate supporting-plate 5 and to turn in the smooth bore of a vertically-adjustable adjusting-sleeve 96. The adjusting-sleeve 96 for each tool-spindle is exteriorly threaded to engage with the interiorly-threaded lower portion 97 of the socket-bushing 98, having a flanged lower end 99 and secured in a bushing-opening 100, formed in the intermediate supporting-plate 5 of the machine frame or stand. Each socket-bushing 98 is of a sufficient length to accommodate the vertical adjustment of the exteriorly-threaded sleeve 96, working therein, and also accommodates therein at the upper end of the sleeve 96 a shaft-collar 101, fitted on the tool-spindle and providing for the support thereof on the sleeve 96, which is employed for adjusting the vertical tool-spindle either up or down. Each adjusting-sleeve 96 for each tool-spindle 82 is provided at its lower end with a radial group of hand-grasps 102, providing convenient means for turning the sleeve to adjust it up or down, and said sleeve is secured fast in its adjusted position by means of a split check-nut 103, embracing the exteriorly-threaded body of the adjusting-sleeve di-

rectly below the lower end of the socket-bushing 98 and having a clamping-screw 104 for binding it tightly on the sleeve to prevent further adjustment thereof in an upward direction. Directly below the lower end of each adjusting-sleeve 96 each tool-spindle 82 is formed with a threaded collar 105 for receiving thereon a pair of washer-nuts 106, and below its threaded collar 105 each tool-spindle is formed with a threaded attaching-tip 107, on which is fitted the interiorly-threaded chuck-block 108.

Each chuck-block 108, which is fitted on the lower end of each tool-spindle in the manner described, is provided in its lower end with a squared socket portion 109 for receiving the squared shank 110 of an ordinary reaming-tool 111, and in the present invention the squared shank 110 of the reaming-tool is formed with a flattened or chamfered corner 112, against which binds a flat locking-plate 113, carried at the inner end of a movable pin 114, working through an opening in a guide-bushing 115, inserted in the outer end of an opening 116, piercing one side of the chuck-block 108. Arranged between the inner end of the bushing 115 and the plate 113 is a coiled spring 117 for normally pressing the locking-plate against the flat corner of the reamer-shank. The movable pin 114 carries at its outer end a finger-button 118, providing convenient means for manipulating the locking device to secure and unfasten the reaming-tool, as desired.

The machine is illustrated as being equipped with four reaming-tools arranged in the same circular plane, so that by a rotation of the holder-table a proper distance before the upward movement thereof provision is made for having each axle-box operated upon by each of the four spindles to complete the proper reaming of the box. By reason of the specific manner of supporting each tool-spindle the same has a vertical adjustment of several inches, whereby each reamer may be set at the proper place to do its work correctly, so that when the table carrying the axle-boxes is fed up against the adjustable stops it will always bring the boxes to the proper point for being reamed the right size, it having been previously explained that by the valve mechanism the table is fed up very rapidly to the point where the reamers begin to cut and then more slowly for the remainder of its upward movement during the cutting of the reamers.

By reference to Fig. 3 in the drawings it will be observed that the tool-spindles are arranged on a circle in such a manner that there will be a fifth blank space between the first and last reaming-tools of the set, which blank space over the table enables the operator to remove finished boxes and replace unfinished boxes in the holders while the machine is operating on the other axle-boxes, and it will also be observed that the holder-table is so arranged as to provide for hold-



ing ten axle-boxes, so that a box is never carried direct from one reamer to the other, but is left standing at an intermediate point to give it a chance to cool between each operation.

From the foregoing it is thought that the construction, operation, and many advantages of the herein-described reaming-machine will be readily apparent to those skilled in the art without further description, and it will be further understood that changes in the form, proportion, and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

Having thus described the invention, what is claimed, and desired to be secured by Letters Patent, is—

1. In a reaming-machine, a vertically-movable table, a plurality of reaming-tools supported for rotation above the table, means for rapidly feeding the table upward to the point where the reaming-tools begin to cut, means for automatically causing the table to stop its own feed at such point, and separate means for slowly completing the upward feed of the table during the cutting of the tools, substantially as set forth.

2. In a reaming-machine, a vertically-movable work-table, fixedly-positioned reaming-tools supported above the table, means for rapidly moving the table upward by hydraulic pressure, and separate means for controlling said hydraulic pressure to provide for stopping the feed of the table at the point where the tools begin to cut, and then slowly completing the feed during the cutting of the tools, substantially as set forth.

3. In a reaming-machine, an upright frame or stand, a vertically-movable table-support slidably mounted within said frame or stand, means for positively feeding said table-support in an upward direction, a horizontal holder-table rotatably mounted on said table-support and carrying a plurality of axle-box holders, a locking device for said table, means for causing said device to engage the table when the latter begins its upward movement, and a plurality of rotating reaming-tools arranged in a circular group above the table, substantially as set forth.

4. In a reaming-machine, an upright frame or stand, a vertically-movable table-support slidably mounted within said frame or stand, means for positively feeding said table-support in an upward direction, a horizontal holder-table rotatably mounted on said table-support and carrying a circular series of axle-box holders, a locking device for said table, means for automatically causing said device to engage with the table as it begins its ascent, a device for releasing the locking device from the table when it reaches its lower limit of movement, and a plurality of rotating reaming-tools arranged in a circular group above the table, substantially as set forth.

5. In a reaming-machine, an upright frame

or stand, a vertically-movable table-support slidably mounted within the frame or stand, means for positively and automatically feeding said support in an upward direction, a holder-table rotatably mounted on said support and carrying a plurality of axle-box holders, said table being provided with a circular series of pin-openings, a gravity weight-lever pivotally supported intermediate of its ends on the table-support and provided with an outer weighted end, a vertically-movable locking-pin pivotally connected with the inner end of said lever and working through an opening in the table-support so as to engage in the pin-openings of the table, an upright fixed strike rod or post arranged at the base of the frame or stand with its upper end disposed in the path of the weighted end of said lever, and a plurality of rotating reaming-tools arranged above the table in line with the holders thereof, substantially as set forth.

6. In a reaming-machine, an upright frame or stand having a circular series of upright frame-rods, a vertically-movable spider table-support having a plurality of radially-extending arms provided with sleeves slidably engaging the upright frame-rod, a holder-table rotatably mounted on said support and carrying a plurality of axle-box holders, a pivot-bolt connection between the table and said support, manual means for rotating the table, and a plurality of rotating reaming-tools supported for rotation above the table, substantially as set forth.

7. In a reaming-machine, an upright frame or stand having a circular series of upright frame-rods, a vertically-movable spider table-support having a plurality of arms provided with sleeves slidably engaging the upright frame-rod, and an annular or circular guide-rib formed on its upper side, a holder-table carrying a circular series of axle-box holders and provided with a depending circular bearing-flange having a lower inner grooved edge embracing said guide-rib, a pivot-bolt connection between the table and said support, means for positively rotating the table for a limited distance, and a plurality of rotating reaming-tools arranged in a circular group above the table, substantially as set forth.

8. In a reaming-tool, a horizontal vertically-movable holder-table provided near its periphery with a circular series of tapered axle-box openings and with short upwardly-disposed securing pins or studs projected from its upper surface at diagonally opposite sides of each opening, separate detachable holder-plates arranged flat on the table over each opening therein and provided with perforated ears to engage with the diagonally opposite pins or studs, and centrally between their ends with collars having notches at diametrically opposite sides of the openings therein, and a plurality of rotating reaming-tools arranged above the table, substantially as set forth.

9. In a reaming-machine, an upright frame



or stand having a circular series of upright frame-rods, a vertically-movable spider table-support having a plurality of slide-sleeves working on said frame-rods, a holder-table  
 5 rotatably mounted on the support and carrying a plurality of axle-box holders, a pivot-bolt connection between said table and its support, a strike-cap fitted centrally on the table over the upper end of the pivot-bolt  
 10 connection, stop-collars adjustably fitted on the upright frame-rods, a depending post supported centrally within the machine frame or stand above the table and provided with a threaded socket, and a central stop-screw ad-  
 15 justably working in said threaded socket and adapted to contact with the strike-cap of the table, substantially as set forth.

10. In a reaming-machine, an upright frame or stand, a vertically-movable table-support  
 20 working within the frame or stand and carrying a holder-table, an upright cylinder supported at the base of the machine frame or stand, a piston-head working in said cylinder and having a rod connection with the table-  
 25 support, rotary reaming-tools supported above the table, a pressure-supply pipe, a valve device interposed in the line of communication between said supply-pipe and the lower end of the cylinder, means for auto-  
 30 matically operating said valve device by the upward movement of the table-support to provide for cutting off the fluid-supply from the cylinder when the table reaches a point where the reaming-tools begin to cut, and separate  
 35 means for delivering a reduced head of fluid to the cylinder for slowly completing the upward feed of the table, substantially as set forth.

11. In a reaming-machine, an upright frame  
 40 or stand having a base-plate formed with a water-passage therein, a vertically-movable table-support working within the frame or stand and carrying a holder-table, an upright cylinder supported on the base-plate and  
 45 communicating at its lower end with the water-passage therein, a piston-head working in the cylinder and having a rod connection with the table-support, rotary reaming-tools supported above the table, a pressure-sup-  
 50 ply pipe, a valve device interposed in the line of communication between said supply-pipe and the lower end of the cylinder, means for automatically operating said valve device by the upward movement of the table-  
 55 support to provide for cutting off the fluid-supply from the cylinder when the table reaches a point where the tools begin to cut, and a valved by-pass feed-pipe of a smaller diameter than the pressure-supply pipe and  
 60 directly connecting said supply-pipe with the water-passage in said base-plate, substantially as set forth.

12. In a reaming-machine, the combination of a vertically-movable table-support carry-  
 65 ing a holder-table, an upright cylinder sup-

ported below the table-support, a piston-head working in the cylinder and having a rod connection with the table-support, the ream-  
 ing-tools, an upright valve-casing formed with separate upper and lower enlarged an-  
 70 nular inlet and discharge chambers respectively and having a lower open end, a supply-pipe connection with the upper inlet-chamber of the valve-casing, a pipe connection between the lower discharge-chamber of  
 75 the casing and the lower end of the cylinder, an inner plunger-cylinder fitted snugly within the valve-casing and provided with separate upper and lower perforate portions communicating respectively with the inlet and  
 80 discharge chambers of the casing, a vertically-movable valve-stem working through the upper end of the casing, an elongated cylindrical plunger-valve fitted on said stem and provided on its lower end with a valve-  
 85 head adapted to cover and uncover the lower perforate portion of said cylinder, and at its upper end with a packing-head, suitable lever connections between the valve-stem and the vertically-movable table-support to pro-  
 90 vide for the automatic upward adjustment of the plunger-valve, and a hand-lever connection with the valve-stem to provide for the setting of the plunger-valve, substantially as set forth.

13. In a reaming-machine, an upright frame or stand having within the upper part thereof an intermediate supporting-plate, a verti-  
 cally-movable table working within the frame or stand and carrying a circular series of  
 100 axle-box holders, a circular group of socket-bushings fitted to the intermediate supporting-plate of the frame or stand and provided with interiorly-threaded lower portions, exteriorly-threaded adjusting-sleeves working  
 105 in the threaded portions of said socket-bushings and provided at their lower ends with a plurality of hand-grasps, split check-nuts adapted to be clamped on the adjusting-sleeves at the lower ends of the socket-bush-  
 110 ings, a circular series of vertically-adjustable tool-spindles arranged within the upper part of the frame or stand and working in the smooth bores of said adjusting-sleeves, said tool-spindles being provided with threaded  
 115 collars arranged below the lower ends of said adjusting-sleeves, washer-nuts fitted on the threaded collars of the tool-spindles, tool-holding chuck-blocks detachably fitted on the lower tip ends of the tool-spindles, and  
 120 gearing for the several tool-spindles to provide for the rotation thereof in unison, substantially as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in  
 125 the presence of two witnesses.

RALPH REED SPEARS.

Witnesses:

JOS. B. BERO,

CHAS. F. SCHULTZE.