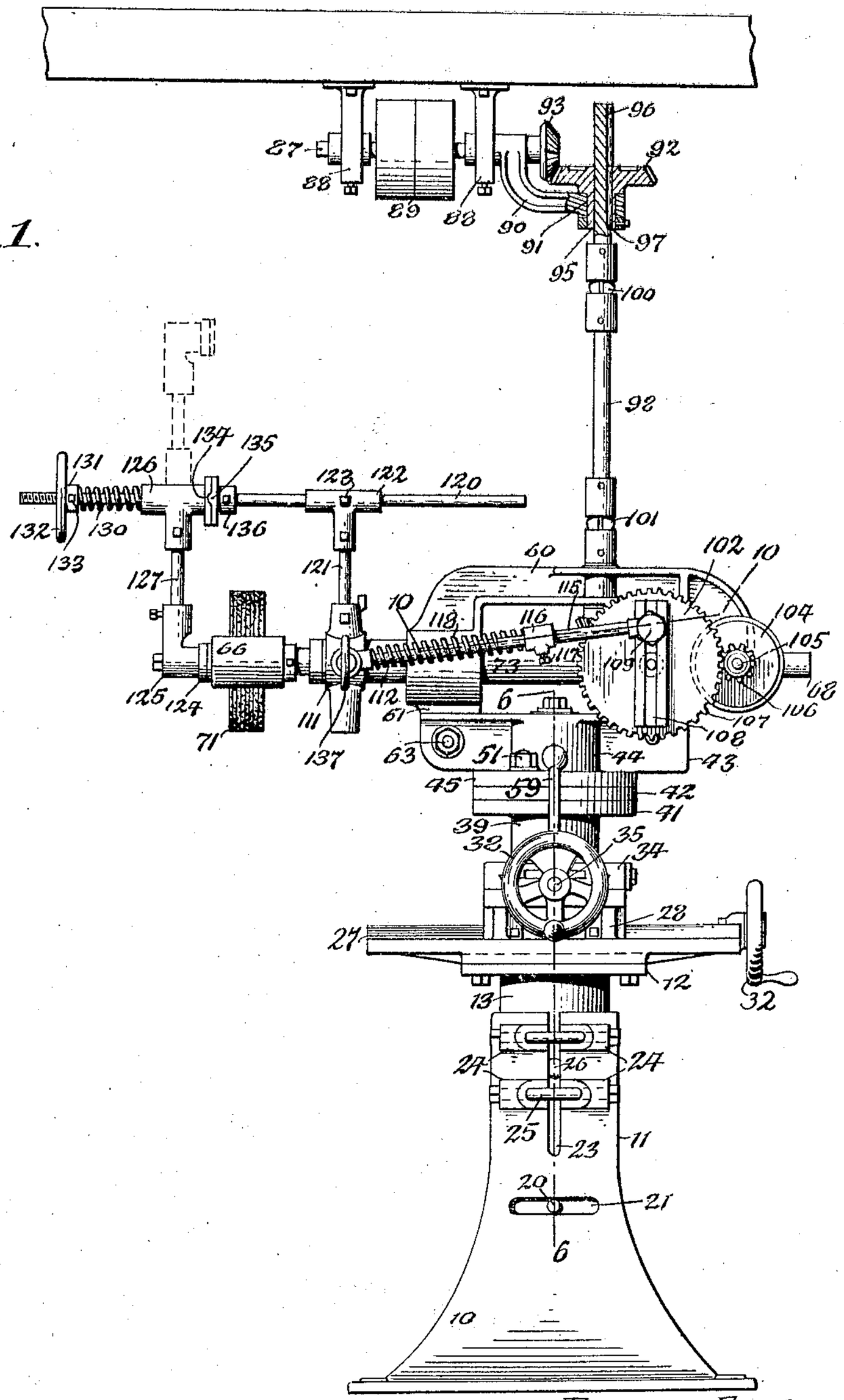
Nov. 18, 1924. L. W. WHEATON 1,515,640

BUFFING MACHINE

Filed Sept. 25, 1922 5 Sheets-Sheet 1

Fig. 1.



Inventor
Lewis W. Wheaton
by Eugene Poole
Attorneys

Nov. 18, 1924.

L. W. WHEATON

1,515,640

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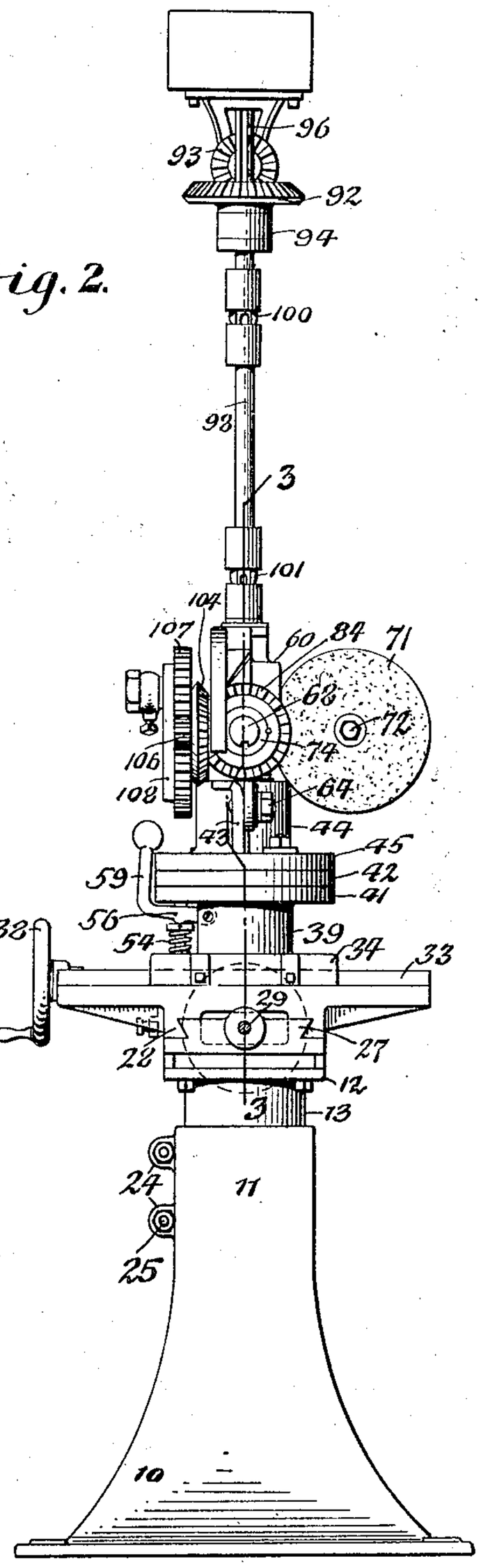
5 Sheets-Sheet 2

Fig. 2.



Inventor
Lewis W. Wheaton
by Lyon & Popp
Attorneys

Nov. 18, 1924. 1,515,640

L. W. WHEATON

BUFFING MACHINE

Filed Sept. 25, 1922 5 Sheets-Sheet 3

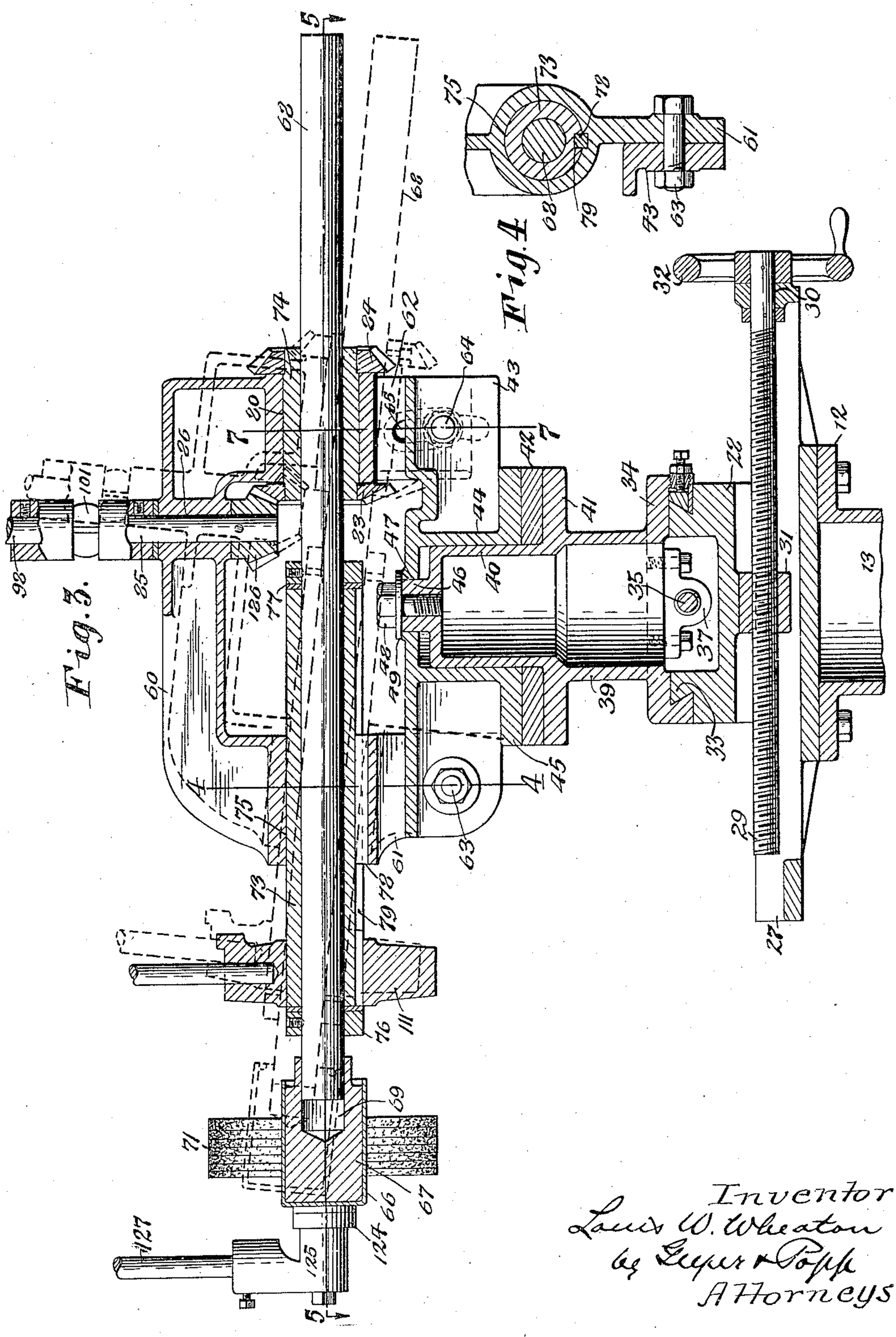


Fig. 4.

Fig. 3.

Inventor
Louis W. Wheaton
by Geyer & Popp
Attorneys

Nov. 18, 1924. 1,515,640

L. W. WHEATON

BUFFING MACHINE

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Fig. 10.

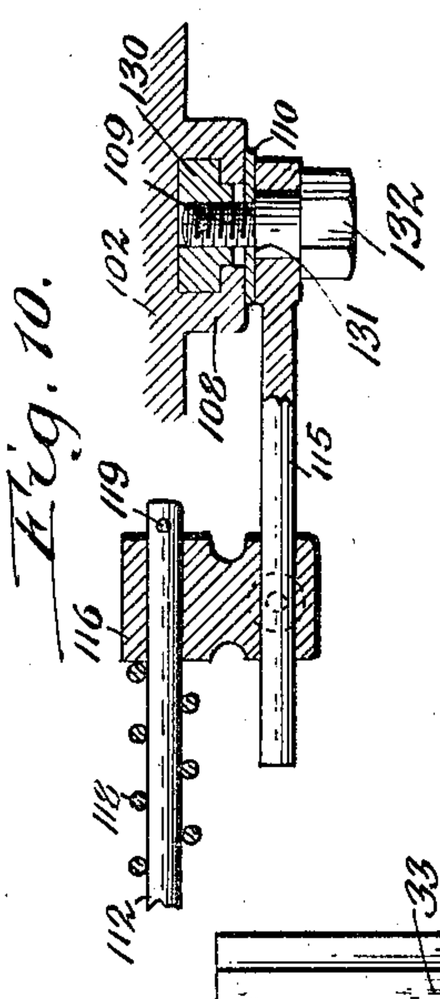


Fig. 5

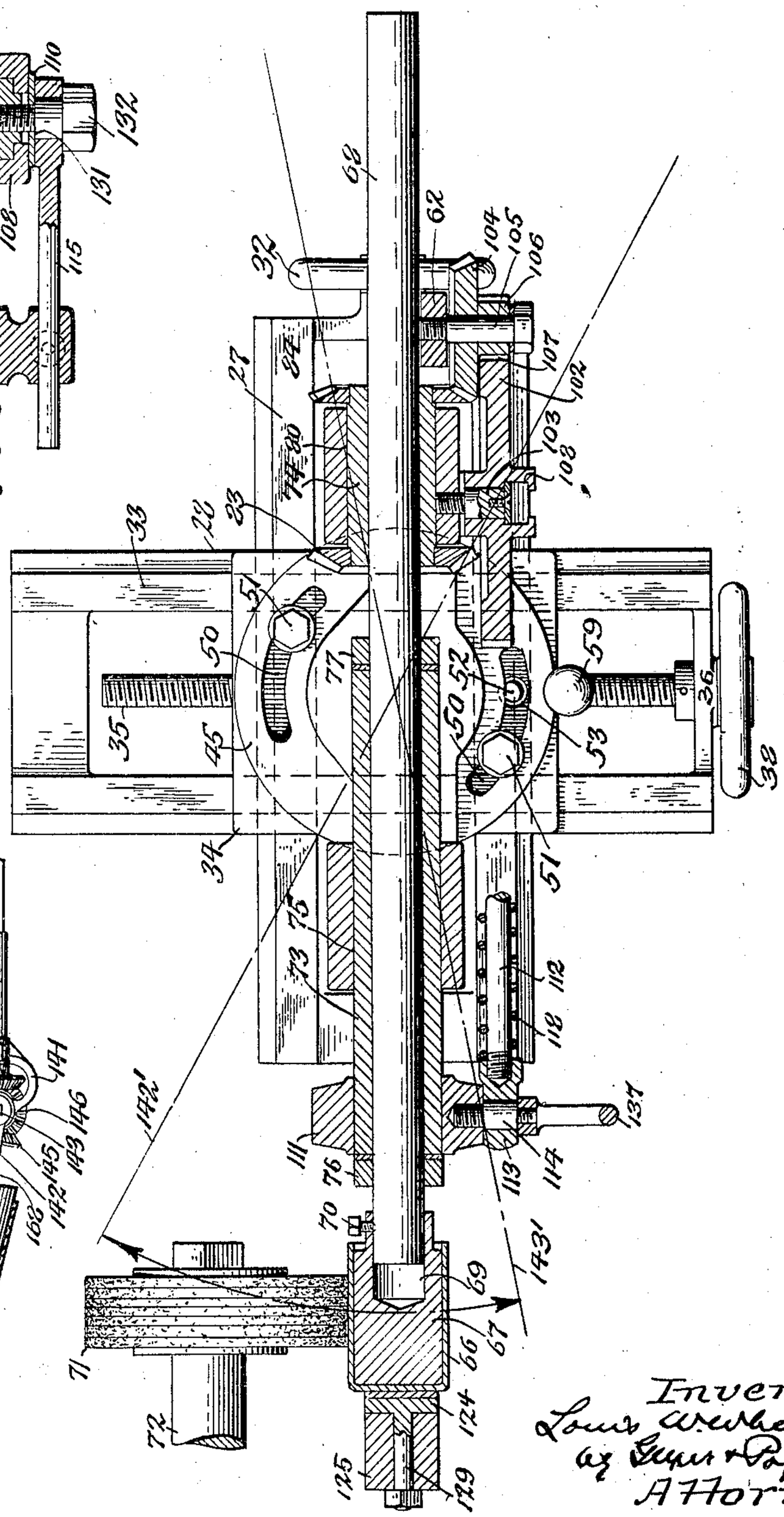
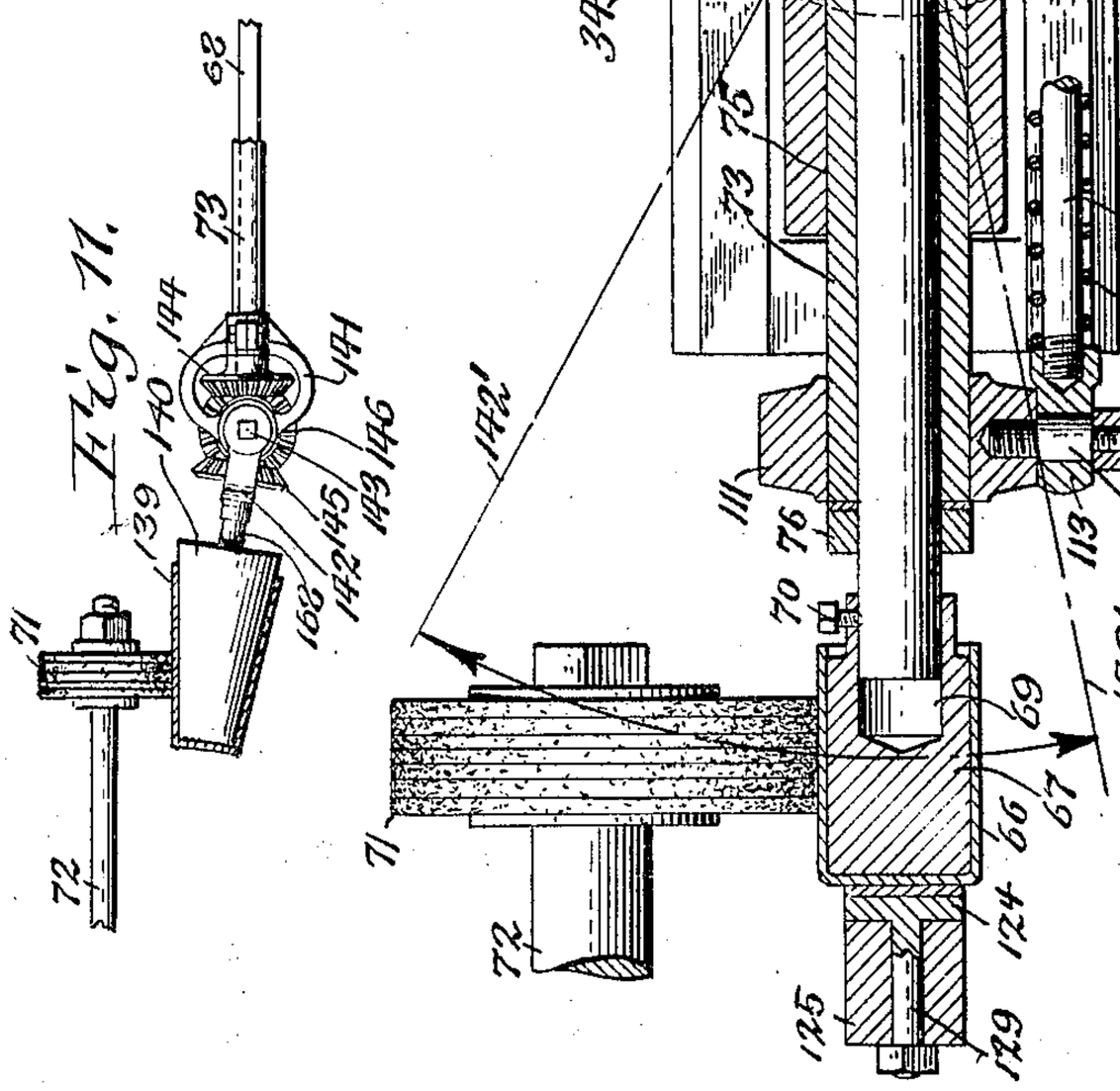


Fig. 11.



Inventor
Louis W. Wheaton
by Lewis & Popp
Attorneys

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L. W. WHEATON

BUFFING MACHINE

Filed Sept. 25, 1922 5 Sheets-Sheet 5

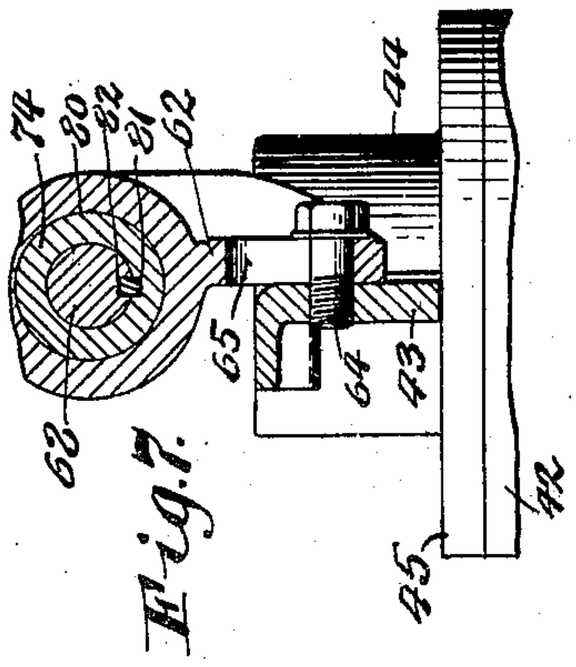

Fig. 7.

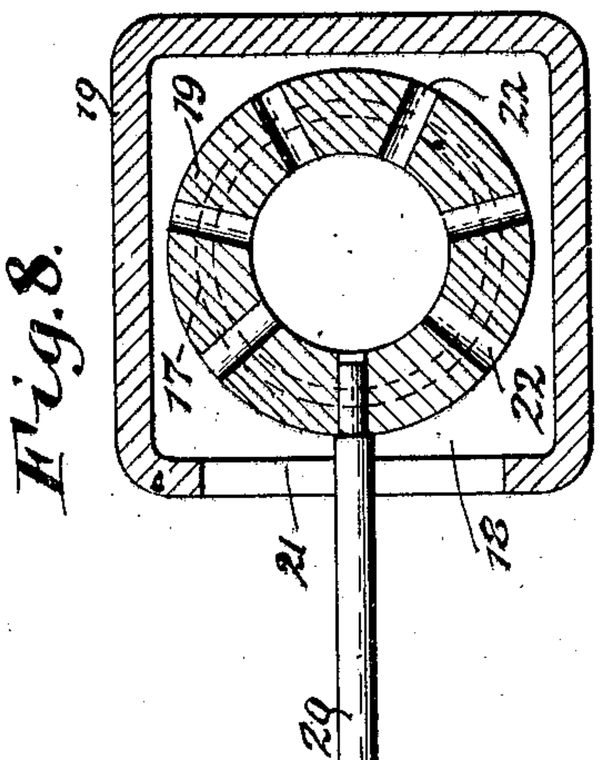

Fig. 8.

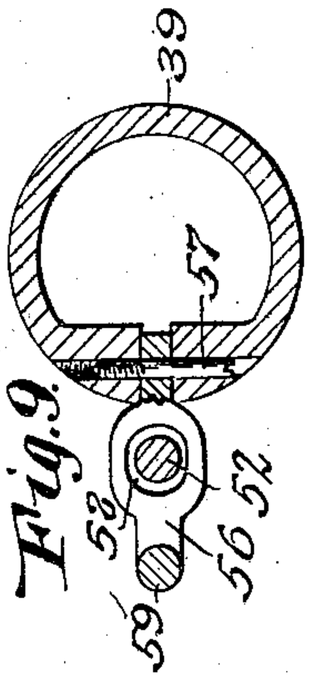

Fig. 9.

Fig. 6.

Inventor
Lewis W. Wheaton
by Lewis Popp
Attorneys

Patented Nov. 18, 1924. 1,515,640

UNITED STATES PATENT OFFICE.

LEWIS W. WHEATON, OF BUFFALO, NEW YORK, ASSIGNOR TO AUTOMATIC BUFFING MACHINE CO., OF BUFFALO, NEW YORK, A CORPORATION OF NEW YORK.

BUFFING MACHINE.

Application filed September 25, 1922. Serial No. 590,232.

To all whom it may concern:

Be it known that I, LEWIS W. WHEATON, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Buffing Machines, of which the following is a specification.

This invention relates to a buffing machine of the general type shown in Letters Patent of the United States No. 911,261, and adapted for buffing and polishing articles by mounting the same on a mandrel and holding the same in engagement with a buffing or polishing wheel.

The object of this invention is to provide means for supporting the article to be buffed and presenting the same to the buffing wheel in such manner that successive articles will engage this wheel in exactly the same direction and at the same angle, thereby preserving the form of the face of the buffing wheel after the same has been once shaped to the surface to be buffed or polished and reducing the wear on the same.

Another object of this invention is to so organize the machine that wear on the buffing wheel may be taken up without disturbing the matching engagement between the peripheral face of the buffing wheel and the surface of the articles to be buffed.

A further object of this invention is to provide means whereby the mandrel or work holder may be moved away from the buffing wheel for removing a finished work piece and substituting an unfinished one and moving the mandrel toward the buffing wheel with the work piece and locking the same in a definite predetermined position, so that the operator is relieved of the necessity of adjusting each work piece or blank separately, thereby saving time and increasing the output of the machine accordingly.

An additional object of the invention is to provide simple and efficient means whereby the work piece may be presented at an angle to the buffing wheel and thus cause the latter to cross the spinning marks on the same and produce a uniformly finished surface.

A still further purpose of the invention is to provide improved means for conveniently raising and lowering the supporting table to suit the required position of the work piece relatively to the buffing wheel either while setting up the machine or when shifting the work piece, so that the buffing wheel operates thereon at an angle to remove spinning marks.

In the accompanying drawings: Figure 1 is a front elevation of a buffing machine embodying my improvements. Figure 2 is an end elevation thereof. Figure 3 is a fragmentary vertical longitudinal section taken on line 3—3, Fig. 2. Figure 4 is a cross section on line 4—4, Fig. 3. Figure 5 is a horizontal section on line 5—5, Fig. 3. Figure 6 is a vertical section, on an enlarged scale, on line 6—6, Fig. 1. Figure 7 is a vertical section on line 7—7, Fig. 3. Figures 8 and 9 are horizontal sections on the correspondingly numbered lines in Fig. 6. Figure 10 is a fragmentary horizontal section, on an enlarged scale, taken on line 10—10, Fig. 1. Figure 11 is a fragmentary plan view, showing the manner of using the machine when buffing conical articles.

Corresponding numerals in the following specification indicate similar parts throughout the several figures of the drawings.

The stationary part or frame of the machine upon which the movable parts of the same are mounted, consists of a base or pedestal 10 which is hollow and of upwardly tapering form and rests with its lower large end on the floor while its upper reduced end has the form of an upright tubular neck 11. Above the base is arranged a horizontal lifting table 12 which is capable of vertical adjustment thereon for a purpose which will presently appear. This table is provided on its under side with a depending tubular shank 13 which is guided in the neck of the base so as to be capable of sliding but held against turning thereon.

Vertical movement of the shank in the neck is effected by an upright lifting screw 14 which has an external screw thread 15 on its upper part engaging with an internal thread 16 on the shank 13 while its lower end turns in a bearing opening 17 formed in a web 18 within the base and is provided with an external annular flange 19 resting on said web, as shown in Fig. 6. Upon turning this screw in one direction or another,

the shank and associated parts are raised or lowered. This turning is effected by means of a pin wrench 20 adapted to be passed through a horizontal slot 21 in the lower front part of the base and engaged with one or another of an annular row of openings 22 in the flange 19 of the lifting screw.

After the shank has been adjusted vertically to the desired position, the same is held firmly in place by providing the hollow neck of the base on one side with a vertical slot 23 and drawing the parts of this neck on opposite sides of this slot, together by means of one or more horizontal clamping bolts 25 each of which connects two lugs 24 arranged on the exterior of the neck on opposite sides of said slot. In order to prevent the shank from turning on the neck, the same is provided with a laterally projecting dowel or key 26 which slides vertically in the slot 23, as shown in Figs. 1 and 6.

Upon its upper side the lifting table has secured thereto a longitudinal horizontal guideway 27 upon which a lower carriage or slide 28 is movable in the direction of the length of the machine. Although various means may be employed for effecting the longitudinal movement of the lower carriage or slide, this is preferably accomplished by a horizontal adjusting screw 29 arranged parallel with the guideway 27 and journaled in a bearing 30 at one end thereof, so as to be capable of turning but held against lengthwise movement. The screw engages with a screw nut 31 on the underside of the lower carriage and is provided at one end with a hand wheel 32 for turning the same.

On its upper side the lower carriage is provided with a horizontal transverse guideway 33 on which an upper carriage or slide 34 is guided, so as to move crosswise of the machine. This crosswise movement of the upper carriage is preferably effected by a horizontal transverse adjusting screw 35 arranged parallel with the transverse guideway and journaled in a bearing 36 at one end thereof, so as to be capable of turning but held against longitudinal movement. This transverse adjusting screw engages with a screw nut 37 on the underside of the transverse carriage and is provided at its front end with a hand wheel 38 for manipulating the same.

Projecting upwardly from the transverse slide or carriage is a post 39 which is provided at its upper end with a pintle 40 having its axis arranged vertically and provided between its upper and lower ends with a lower head or flange 41. Resting on this head or flange and rotatable on the same and around the pintle 40 is a locating disk 42. Immediately above the post is a horizontal saddle 43 which forms the lower part of a turret and which has a swivel connection with the post, so as to be capable of turning about a vertical axis. This swiveling connection preferably consists of a cylindrical socket 44 projecting downwardly from the central part of the saddle and turning on the periphery of said pintle, an upper head or flange 45 projecting laterally from the lower end of said socket and resting on said disk 42, a circular stud 46 projecting from the top of said pintle through an opening 47 in the top of said socket and a retaining screw 48 secured to said stud and bearing by means of a washer 49 against the upper side of said pintle for confining the same on the post.

The upper head 45 is adapted to be adjusted circumferentially on the locating disk and then held in place relatively thereto, this being preferably accomplished by two segmental slots 50 arranged in the upper head on opposite sides of the saddle, and two clamping bolts 51 extending through these slots and engaging their lower threaded ends in the locating disk while the heads of these bolts bear against the upper side of said upper head.

The locating disk is locked against rotation when in a predetermined position relatively to the lower head 42 by means of a vertically movable locking pin or catch 52 guided on said cross slide and lower head and adapted to engage its upper end with a locking opening 53 in the locating disk, a spring 54 surrounding said catch and bearing at its lower end against said cross slide and at its upper end against a collar 55 on the catch for holding the latter yieldingly in its elevated operative position, and an elbow shaped operating lever having a lower horizontal arm 56 which is pivoted on the post by a horizontal pin 57 and provided with an opening 58 for the passage of the catch pin and engages its underside with the top of the collar 55, and an upper arm 59 projecting upwardly from the front end of said lower arm, as shown in Figs. 6 and 9.

Above the saddle is arranged a yoke which forms the upper part of the turret and which has an upper horizontal longitudinal bar 60 and arms 61, 62, depending from the front and rear ends of this bar. The yoke is so mounted on the saddle as to be compelled to turn therewith about a vertical axis, but the yoke is capable of tilting about a horizontal axis for a purpose which will be explained later on. The means for thus tilting the yoke relatively to the saddle and holding the same in place after adjustment comprise a horizontal pivot bolt 63 connecting the front yoke arm with the adjacent front end of the saddle and a clamping screw 64 secured to the rear end of the saddle and passing through a curved slot

65 in the rear yoke arm and adapted when tightened to clamp the yoke securely against vertical movement on the saddle.

The work piece or article 66 to be buffed or polished is supported on a chuck, mandrel or holder 67 which is carried on one end of a buffing shaft 68. The latter is normally arranged horizontally and the connection between the same and the chuck is preferably affected by boring a recess 69 in the rear end of the latter and securing the front end of the buffing spindle by a set screw 70, as shown in Fig. 5. The article to be buffed may be varied in form, the example shown in the drawings being a cup having a cylindrical body and a head closing the front end of the body and the chuck being of corresponding form to fit this article. The buffing shaft is so mounted on the yoke that the same rotates about its axis or the same may have combined rotary and longitudinally reciprocating movement depending on the character of the work which is being buffed. For the present it will be assumed that the buffing shaft requires a rotary and longitudinal movement as would be the case when buffing the comparatively long cylindrical body of the cup or can shown in the drawings, in order to bring all parts of this body in engagement with the periphery of the buffing wheel 71 and still not make the latter unduly wide. This buffing wheel may be mounted in any suitable way but preferably on the end of a spindle 72 which is journaled so that the same is horizontal and parallel with the path of the longitudinally movable carriage and which may be rotated by any suitable means. As best shown in Figs. 3, 4, 5 and 7, the buffing shaft is mounted with its front part in a bearing sleeve 73, forming a bearing therefor and with its rear part in a driving sleeve 74 forming part of the means for driving the shaft. The bearing sleeve 73 is capable of sliding lengthwise in an opening 75 in the front arm of the yoke and the buffing shaft is compelled to move lengthwise with the same by front and rear collars 76, 77, secured to the buffing shaft and engaging with the front and rear ends of the bearing sleeve. The latter is however prevented from turning in the yoke by means of a spline 78 arranged on the yoke and engaging a longitudinal groove 79 in the underside of the bearing sleeve. The driving sleeve 74 is capable of turning in a bearing opening 80 in the rear arm of the yoke and the buffing shaft is compelled to turn therewith but is free to slide therein by a spline 81 arranged on this sleeve and engaging with a longitudinal groove 82 in the buffing shaft. The driving sleeve is however held against lengthwise movement in its bearing by a front bevel gear wheel 83 secured to the front end of this sleeve and engaging with the front side of the rear yoke arm, and a rear bevel gear wheel 84 secured to the rear end of this sleeve and engaging with the rear side of this arm. Upon rotating the driving sleeve, the buffing shaft turns with it and at the same time the shaft may slide in the driving sleeve and move lengthwise with the bearing sleeve 73 in which the front part of this shaft turns.

Above the buffing shaft is arranged an upright driving shaft 85 which is journaled in a bearing 86 in the bar of the yoke and provided at its lower end with a bevel gear pinion 186 which meshes with the front gear wheel 83. Motion is transmitted to the driven shaft 85 by an intermediate transmitting mechanism from an overhead driving shaft 87 which is journaled horizontally in suitable bearings 88 on the ceiling and provided with driving belt pulleys 89. This intermediate transmitting mechanism is so organized that the same is flexable and permits the yoke and associated gearing to be raised and lowered and also shifted horizontally in order to adapt the work piece to the buffing wheel without however disturbing the driving connection between the several parts. In the preferred form of its transmitting mechanism as shown in Figs. 1, 2 and 3, the same comprises a swivel bracket 90 journaled on the driving shaft 87 so as to swing about the axis of the same and provided with a vertical bearing 91, a driven gear wheel 92 meshing with a driving gear wheel 93 on the driving shaft 87 and having a tubular hub 95 journaled in the vertical bearing 91 on the swivel bracket, an upper sliding shaft 96 sliding vertically in the tubular hub 95 but splined thereto by a spline 97, so as to be compelled to turn therewith, and an upright intermediate shaft 98 connected at its upper and lower ends by universal joints 100, 101, with the lower end of the sliding shaft 96 and the upper end of the lower vertical shaft 85.

The longitudinal movement of the buffing shaft and the parts connected therewith is effected by the following mechanism:

102 represents a crank disk pivoted on the rear arm of the yoke by a pin 103 and rotated by means of a driven bevel gear wheel 104 pivoted by a pin 105 on the rear end of the yoke bar and meshing with the rear bevel gear wheel 84, and a gear pinion 106 turning with the bevel gear wheel 104 and meshing with a gear rim 107 on the periphery of the crank disk. On its outer side the latter is provided with an undercut adjusting channel 108 extending diametrically across the same which receives the nut 130 of an adjustable wrist bolt 109. Mounted on the shank or body of this bolt and engaging the outer side of the guide channel is a washer 110. Upon tightening

the bolt 109 a shoulder 131 on its shank engages the outer side of the washer 110 and presses the same against the outer side of the channel 108 while its thread draws the nut 130 against the inner side of the same, thereby holding the bolt in place. Upon shifting the bolt 109 toward and from the center of the crank disk the longitudinal reciprocating stroke of the buffing shaft and associated parts may be varied to suit the requirements of the work. When this bolt is shifted to the center of the crank disk no crank movement whatever is obtained therefrom at which time the buffing shaft merely rotates but does not reciprocate, this being suitable for buffing certain kinds of work. On the front end of the bearing sleeve 73 is mounted a cross head 111 which is connected with the crank disk so as to be actuated thereby. In the preferred construction this is accomplished by a pitman which is capable of yielding lengthwise when subjected to excess pressure and which comprises a front connecting rod section 112 provided at its front end with a pivot head 113 which is pivoted by a pin 114 to the outer side of said cross head, a rear connecting rod section 115 pivoted at it rear end on the wrist bolt between the head 132 thereof and the washer 110, a cross piece or coupling 116 capable of longitudinal adjustment on the front end of the rear rod section 115 by means of a set screw 117 and also slidable lengthwise on the rear end of the front rod section 115, a spring 118 surrounding the front rod section and interposed between the pivot head 113 and the cross piece or coupling 116, and a pin 119 secured to the rear end of the front connecting rod section and serving as a stop to limit the expansion of the spring 118 and the backward movement of the coupling on its rod, as shown in Figs. 1, 5 and 10. The spring 118 is sufficiently stiff so that the pitman is practically rigid when the work piece on the chuck is moved with its outer side back and forth past the buffing wheel but when an end press is exerted by the buffing shaft, as for instance, when burnishing the inner side of a cup shaped blank up to the inner side of its head, at which time the spring 118 will yield when the stroke of the crank disk is such that the same continues its throw after the buffing wheel has reached the bottom of the blank and thereby prevents injury to any of the parts.

When the shape of the article to be buffed permits, for instance when buffing cup-shaped articles as shown in Figs. 1, 2, 3 and 5, the same is also supported on the outer side of its head or bottom, the preferred means for this purpose being constructed as follows:

120 represents a horizontal supporting rod arranged lengthwise above the buffing shaft and chuck and capable of longitudinal adjustment on the cross head 111 by a post 121 rising from the cross head and provided with a sleeve 122 in which the supporting rod is adjustably secured by a set screw 123. The outer side of the bottom or head of the article being buffed is engaged by a supporting disk 124 which is preferably capable of rotation in a bearing 125 which is so mounted that the supporting disk is capable of movement toward and from the work piece to permit of holding the same and replacing it when finished by another unfinished one. For this purpose, a guide sleeve 126 is slidably mounted on the supporting rod 120 and connected by a vertical clamping arm or rod 127 with the bearing 125 in which the pivot pin 129 of the supporting disk 124 turns.

The sleeve 126 is pressed backwardly by a spring 130 surrounding the rod 120 and bearing at its rear end against this sleeve while its front end bears against an adjustable screw nut 131 engaging with the threaded front end of the rod and adapted to be turned by the hand wheel 132 and held in its adjusted position by a set screw 133.

In order to enable the operator to conveniently and quickly center the supporting disk 124 relatively to the work piece and retain the same in place during the operation of the machine, the inner or rear end of the guide sleeve 126 is provided with a locking recess 134 which receives a corresponding key 135 on a collar 136 secured to the adjacent part of the supporting rod. When the buffing of an article has been finished, the clamping arm 127 is moved forwardly and upwardly sufficiently to release the article and permit its removal from the chuck and substitution of another article to be buffed, as shown by dotted lines in Fig. 1.

If the character of the article is such that the pressing or holding device is not required, then the same may be swung upwardly into an inoperative position, as shown by dotted lines in Fig. 1, or removed from the machine.

In setting up the machine, the longitudinal guideway 27 is preferably arranged parallel with the spindle of the buffing wheel and the several supporting members are raised, so as to bring the buffing shaft horizontally in line with the axis of the buffing wheel.

Assuming that the article is comparatively long and cylindrical, and that its surface cannot be covered at one time by the peripheral face of the buffing wheel, as for instance the cylindrical shell shown in Figs. 1, 3 and 5, the buffing shaft is adjusted so that the same is parallel with the buffing wheel, and the stroke mechanism is adjusted so as to reciprocate the buffing shaft

and carry the article back and forth far enough to present the entire surface of the article which is to be polished to the buffing wheel. Preparatory to operating the machine, the parts are set to bring the same into this position by first moving the longitudinally movable carriage to such a position that the article to be buffed will be in the required longitudinal position relatively to the buffing wheel.

The turret consisting mainly of the yoke and saddle is then turned horizontally on the post of the upper transversely movable carriage, while the bolts 51 are loose and the latch 52 is holding the locating disk 42 against turning, until the buffing shaft is parallel with the buffing wheel, after which the clamping bolts 51 are tightened. The transversely movable carriage is next moved backwardly sufficiently to engage the cylindrical body of the blank with the peripheral surface of the buffing wheel under the desired pressure. Upon starting the machine, the article will be reciprocated lengthwise in engagement with the buffing wheel for a sufficient length of time to give the same the required polish or burnish. While this buffing operation is in progress, the turret which supports the buffing shaft is held against turning horizontally on the post of the transverse carriage by the catch on the latter engaging with the locating disk secured to the saddle. When buffing of the article has been completed, the operator first releases the turret by withdrawing the catch 52 and then turns the turret horizontally by means of a handle or grip 137 preferably arranged on the cross head of the bearing sleeve, so that the article is moved forwardly away from the periphery of the buffing wheel. The finished article is now removed from the chuck, an unfinished article substituted therefor, and the turret is again turned horizontally in the direction for engaging the article with the buffing wheel and when this is done, the catch automatically interlocks with the locating disk and holds the turret in the adjusted operative position. The operator therefore need pay no attention when swinging the chuck toward the buffing wheel in order to get the required contact between the buffing wheel and the article to be buffed, inasmuch as this has been predetermined by the initial adjustment of the chuck relatively to the buffing wheel, so that the snapping in of the catch always definitely locates the article relatively to the buffing wheel. When the periphery of the latter becomes worn, it is only necessary to move the transverse carriage backwardly the required extent to take up the wear on the buffing wheel without disturbing the adjustment of any of the other parts of the machine.

If the article to be buffed is comparatively short or narrow so that the same can be covered effectively by the peripheral face of the buffing wheel, then the stroke mechanism for moving the article lengthwise past the buffing wheel can be rendered inoperative, but the operation of the turret and the parts associated therewith is in all other respects the same.

When the article to be polished has substantially the form of a cone, the side 139 of which is arranged at an angle to the axis of the chuck 140 on which the same is mounted, then the chuck is connected with the buffing shaft by a special fitting which is shown in Fig. 11, but the longitudinal carriage still reciprocates parallel to the axis of the buffing wheel, so as to bring all parts of the surface of the conical article into engagement with the buffing wheel. This special fitting comprises a bracket 141 secured to the front end of the bearing sleeve 73, a swiveling yoke 142 pivoted to the bracket 141 and adjustably connected therewith by a pivot and clamping bolt 143, an angle buffing shaft extension 168 journaled on the yoke and carrying the chuck 140, a driving bevel wheel 144 secured to the buffing shaft 68, a driven bevel wheel 145 connected with the buffing shaft extension and an intermediate bevel gear wheel 146, meshing with said driving and driven bevel wheels and mounted to turn concentrically with the pivot and clamping bolt 143. Upon loosening the latter the extension buffing shaft may be arranged at various angles to the axis of the buffing wheel to suit the requirements of the work in hand. The chuck 140 may be locked by the catch 52 in its operative position in which its axis is arranged at an angle to that of the buffing wheel and the same may be swung forwardly to permit of substituting an unfinished for a finished article on the chuck.

If desired, however, the parts may be so adjusted that when the chuck is holding an article in engagement with the buffing wheel, the axis of the chuck and buffing shaft may be inclined backwardly relatively to the longitudinal carriage, as shown by the broken line 142′ in Fig. 5, and may be inclined forwardly relatively to the same, as shown by the broken line 143′ in the same figure, into the position for exchanging the finished for the unfinished article.

By thus employing a catch for holding or locking the chuck in a definite position relatively to the buffing wheel and preferably one which operates automatically when the chuck reaches its working position, successive work pieces will always be presented to the buffing wheel in exactly the same manner and subjected to the same buffing action without requiring any care on the part of the operator, other than adjusting the relative position of the parts to take

up the wear on the buffing wheel. This is particularly advantageous when polishing or buffing articles having circumferential bands, beads or other ornamental formation which necessitates forming the peripheral surface of the buffing wheel to correspond to the shape of the surface being buffed. In such a sase, the successive articles are all presented to the buffing wheel in exactly the same position, so that after the periphery of the latter has been once formed to correspond with the surface of the article to be buffed, the same will match each other and the buffing operation will proceed the instant that the article and buffing wheel are brought together. Obviously this effects a great saving in the cost of buffing wheels inasmuch as the peripheral shape of the buffing wheel after the same is once formed, is not disturbed except that it will wear back uniformly and preserve its shape, but there will be no continuous tearing up of the periphery of the buffing wheel by constantly presenting the articles to be buffed indiscriminately and irregularly thereto and thus causing undue wear of the buffing wheel and cost in maintenance.

If the article to be buffed contains circumferential spinning marks which were produced in course of its manufacture and ordinary buffing will not eliminate the same, then the chuck is adjusted into such a position that the buffing wheel will cross these spinning marks at an angle and thereby remove the same from the article at the same time that it is polished. This is accomplished by shifting the rear end of the yoke vertically relatively to the saddle so that the buffing shaft inclines relatively to the axis of the buffing wheel, as shown by dotted lines in Fig. 3, this adjustment being possible due to the pivotal connection 63 between the front ends of the yoke and saddle of the turret and the bolt and slot connection 64, 65 between the rear ends of these elements.

When said yoke is adjusted to tilt the buffing shaft for the purpose mentioned, a corresponding vertical adjustment of the table 12 on the base must be effected in order to compensate for any dislocation and maintain the work piece in the proper position against the buffing wheel.

Due to the various adjustments which have been provided between the several parts of this machine and the relative arrangement and construction of the same, this machine is capable of universal use in buffing articles having a wide variety of shapes and renders it possible to effectively buff such articles expeditiously, conveniently, and economically.

I claim as my invention:

1. In a machine of the character described, a hollow base having a tubular neck at its upper end and an internal web below said neck which is provided with a bearing opening, a table having a depending tubular shank slidable vertically in said neck and provided with an internal screw thread, and a rotatable adjusting screw having its lower part turning in said opening and provided with an external flange which rests on said web and having its upper part provided with an external screw thread which engages the thread of said shank.

2. In a machine of the character described, a base provided at its upper end with a vertical tubular guide, a table provided with a depending threaded shank slidable vertically in said guide, and adjusting screw journaled in said base and having its thread engaging with the thread of said shank, said tubular guide being provided with a vertical slot, and a key arranged on said shank and sliding vertically in said slot.

3. In a machine of the character described, a base provided at its upper end with a tubular neck which has a longitudinal slot and external lugs on oppposite sides of said slot and a bearing web below said neck, a table having a depending shank which is slidable vertical in said neck and provided with an internal screw thread, an adjusting screw rotatably mounted on said web and having an external screw thread engaging with the thread of said shank, a key arranged on said shank and engaging with said slot, and a clamping bolt connecting said lugs.

4. In a machine of the character described, a base, a longitudinally movable carriage mounted on said base, a transversely movable carriage mounted on the longitudinally movable carriage, an intermediate member rotatably mounted on said transversely movable member, a support rotatably mounted concentrically with said intermediate member, means for adjusting said support circumferentially relatively to said intermediate member, means for locking said intermediate member against turning on said transversely movable carriage, and a rotary work supporting spindle mounted on said support.

5. In a machine of the character described, a horizontally movable carriage, an intermediate member rotatable on said carriage, a support rotatable about an axis concentric with said intermediate member, means for adjusting said support and intermediate member circumferentially relatively to each other, means for locking said intermediate member and carriage against rotation one relatively to the other, and a rotary work supporting spindle mounted on said support.

6. In a machine of the character described, a post provided at its upper end with a pintle and a lower head, a locating

disk resting on the lower head and rotatable around said pintle, a saddle having a socket turning on said pintle and provided with an upper head arranged above said locating disk, a rotary work supporting spindle mounted on said saddle, means for circumferentially adjusting said saddle on said locating disk, and means for locking said locating disk against rotation on said post.

7. In a machine of the character described, a post provided at its upper end with a pintle and a lower head, a locating disk resting on the lower head and rotatable around said pintle, a saddle having a socket turning on said pintle and provided with an upper head arranged above said locating disk, a rotary work supporting spindle mounted on said saddle, means for circumferentially adjusting said saddle on said locating disk comprising a segmental slot formed in said upper head and a clamping bolt arranged in said slot and operating to press said locating disk and upper head together, and means for locking said locating disk against rotation on said post.

8. In a machine of the character described, a post provided at its upper end with a pintle and a lower head, a locating disk resting on the lower head and rotatable around said pintle, a saddle having a socket turning on said pintle and provided with an upper head arranged above said locating disk, a rotary work supporting spindle mounted on said saddle, means for circumferentially adjusting said saddle on said locating disk, means for locking said locating disk against rotation on said post, a locking opening arranged in the locating disk, a catch guided on the lower head and movable into and out of said opening, a spring for yieldingly holding said catch in engagement with said opening, and a lever for disengaging said catch from said opening and having a lower horizontal arm pivoted at its rear end on the post and actuating said catch and an upper vertical arm projecting upwardly from the front end of said lower arm.

9. In a machine of the character described, a support comprising a lower member, an upper member pivotally mounted on the lower member, so as to be capable of tilting vertically on the latter in a plane parallel with the length of said upper member and a buffing shaft journaled on said upper member lengthwise of the latter.

10. In a machine of the character described, a support comprising a lower member, an upper member pivoted at one end to the corresponding end of the lower member so as to be able of swinging vertically, means for vertically adjusting the other end of said upper member relatively to the lower member, and a buffing shaft journaled on said upper member.

11. In a machine of the character described, a support comprising a lower saddle, an upper yoke having a depending front arm pivoted to the front end of said saddle, and also having a depending rear arm, an adjusting device between the rear end of said saddle and said rear arm comprising a clamping bolt passing through said slot and connecting said saddle with said rear arm, and a buffing shaft journaled on said arms of the yoke.

12. In a machine of the character described, a post, a turret having a lower saddle rotatable on said post about a vertical axis, a yoke mounted on said saddle and capable of being tilted vertically thereon, and a buffing shaft journaled on said yoke.

13. In a machine of the character described, a post, a turret having a lower saddle rotatable on said post about a vertical axis, a yoke mounted on said saddle and capable of being tilted thereon, a buffing shaft journaled on said yoke, a transversely movable carriage supporting said post, and a longitudinally movable carriage supporting said transversely movable carriage.

14. In a machine of the character described, a post, a turret having a lower saddle rotatable on said post about a vertical axis, a yoke mounted on said saddle and capable of being tilted thereon, a buffing shaft journaled on said yoke, a transversely movable carriage supporting said post, a longitudinally movable carriage supporting said transversely movable carriage, a base, and a table carrying said longitudinally movable carriage and adjustable on said base.

15. In a machine of the character described, a support, a driving sleeve journaled on said support, a buffing shaft slidable in said driving sleeve but compelled to turn therewith, a driving shaft journaled on said support and geared to one end of said sleeve, and means for reciprocating said buffing shaft geared to the other end of said sleeve.

16. In a machine of the character described, a support, a driving sleeve journaled on said support, a buffing shaft slidable in said driving sleeve but compelled to turn therewith, a driving shaft journaled on said support and geared to one end of said sleeve, and means for reciprocating said buffing shaft comprising a crank disk mounted on said support, a pitman operatively connected with said crank disk and said buffing shaft, a pinion geared to said crank disk, and co-operating gear wheels connected respectively with said pinion and the other end of said driving sleeve.

17. In a machine of the character described, a support, a driving sleeve journaled on said support, a buffing shaft slidable in

said driving sleeve but compelled to turn therewith, a driving shaft journaled on said support and geared to one end of said sleeve, and means for reciprocating said buffing shaft comprising a crank disk mounted on said support, a pitman operatively connected with said crank disk and said buffing shaft, a pinion geared to said crank disk, co-operating gear wheels connected respectively with said pinion and the other end of said driving sleeve, and a pivot on said support for said pinion and the respective gear wheel.

LEWIS W. WHEATON