No. 732,801. PATENTED JULY 7, 1903.

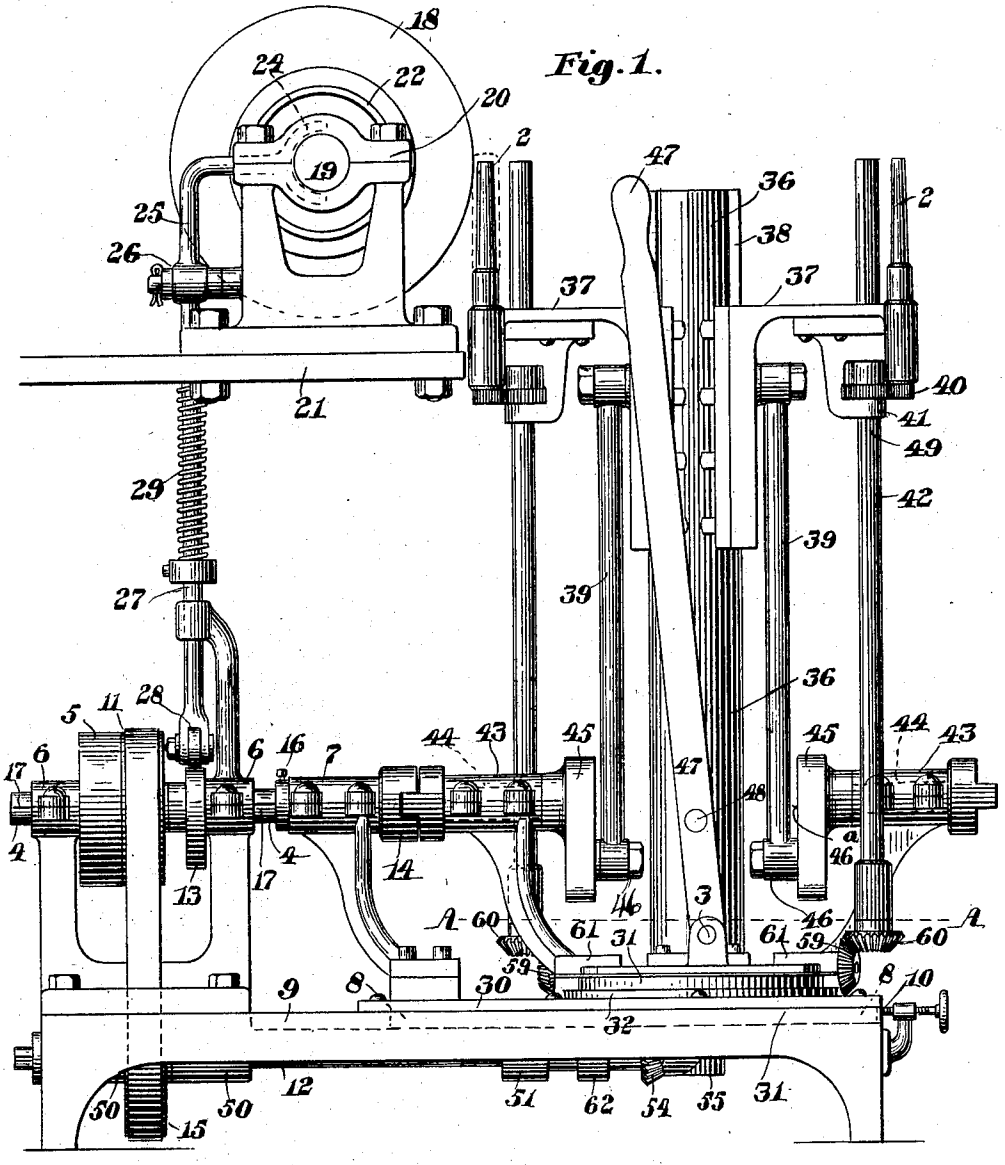
C. L. TURNER.

MACHINE FOR POLISHING ATOMIZER TUBES.

APPLICATION FILED FEB. 16, 1901.

NO MODEL. 4 SHEETS—SHEET 1.

Fig. 1.



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NO MODEL. 4 SHEETS—SHEET 2.

Fig. 2

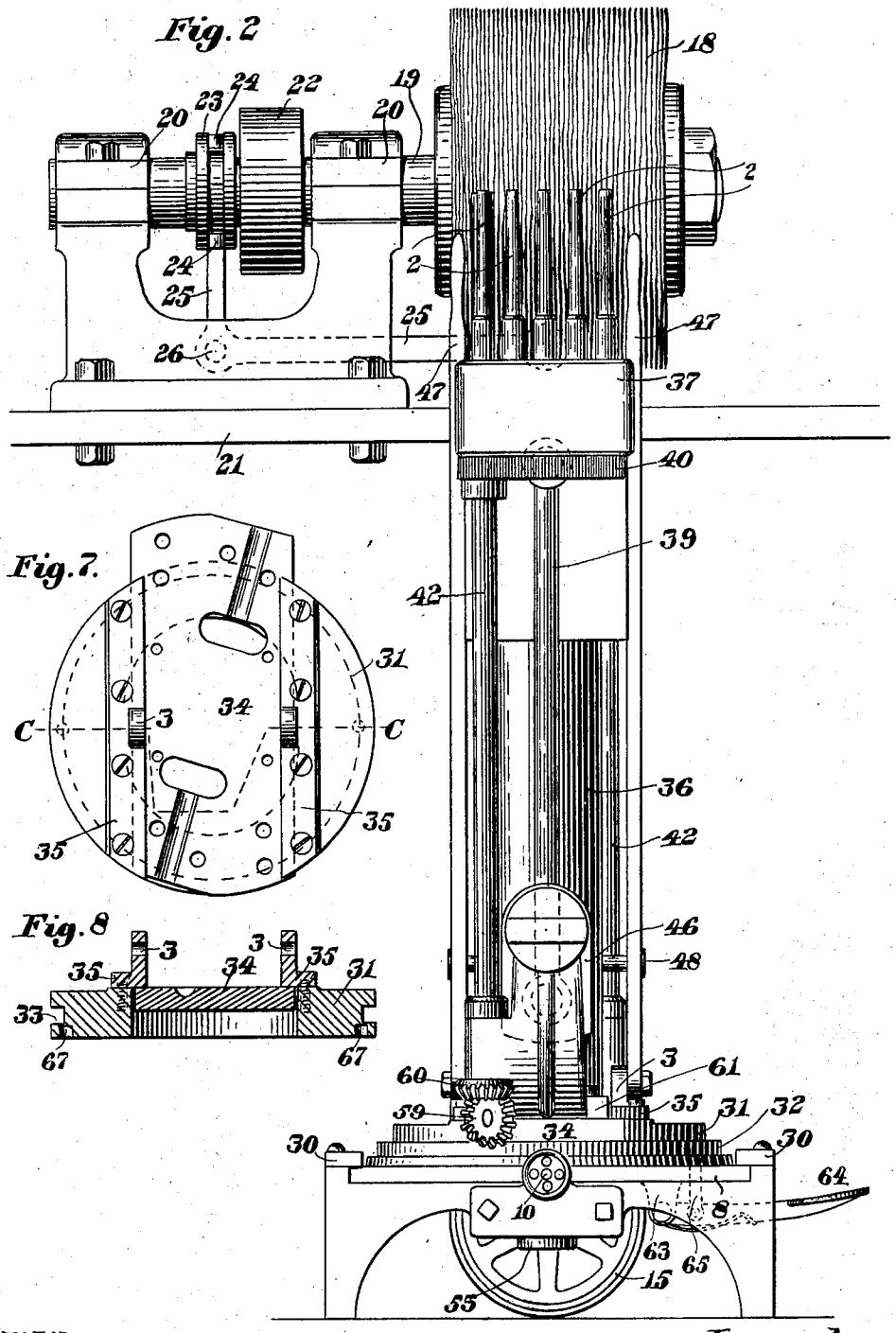

Fig. 7.

Fig. 8

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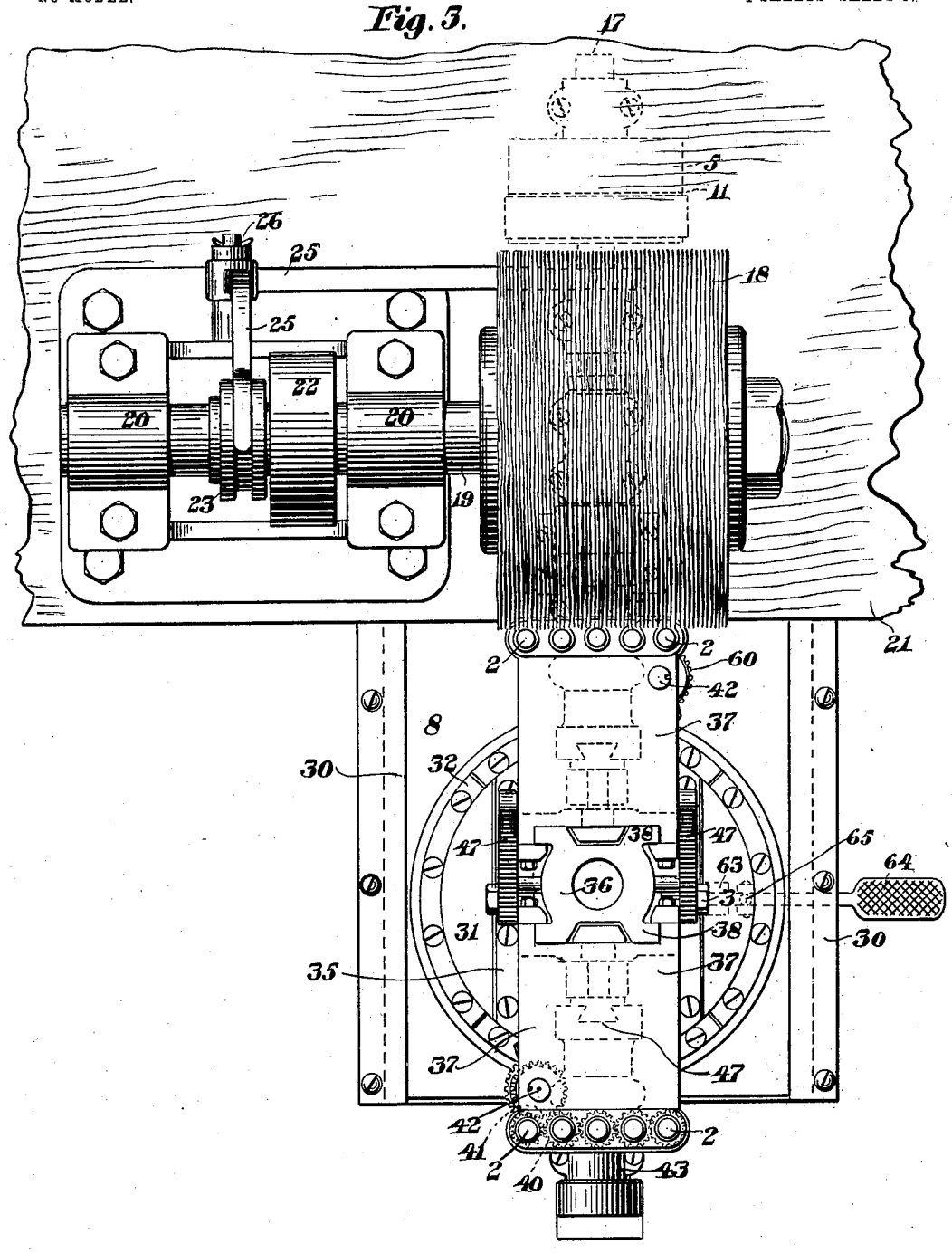
NO MODEL. 4 SHEETS—SHEET 3.

Fig. 3.



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NO MODEL. 4 SHEETS—SHEET 4.

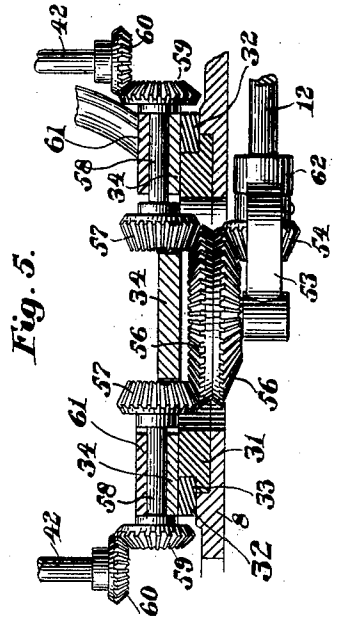

Fig. 5.

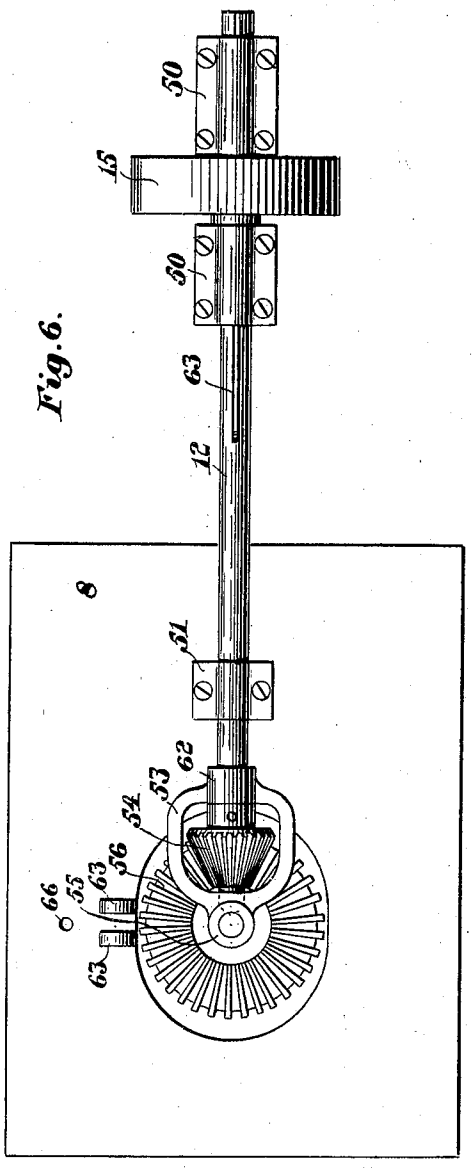

Fig. 6.

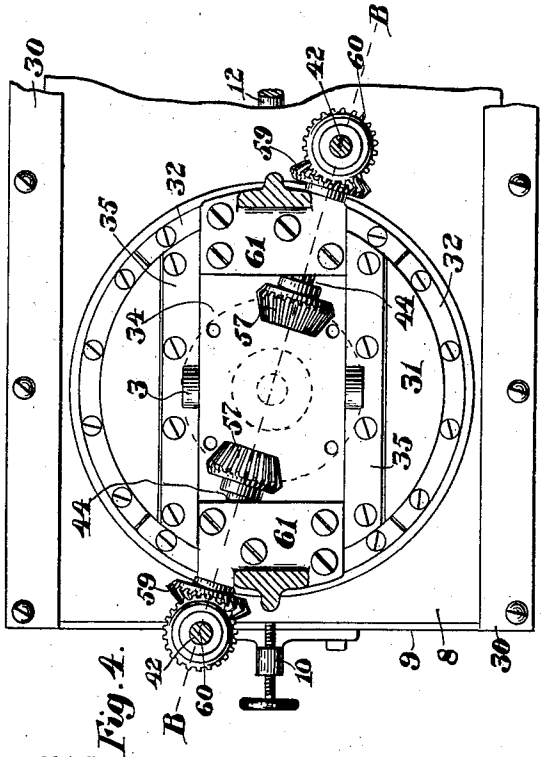

Fig. 4.

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UNITED STATES PATENT OFFICE.

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MACHINE FOR POLISHING ATOMIZER-TUBES.

SPECIFICATION forming part of Letters Patent No. 732,801, dated July 7, 1903.

Application filed February 16, 1901. Serial No. 47,637. (No model.)

To all whom it may concern:

Be it known that I, CHARLES L. TURNER, a citizen of the United States, residing at Winthrop, in the county of Suffolk and State of Massachusetts, have invented a new and useful Machine for Polishing Atomizer-Tubes and Similar Small Cylindrical Bodies of Hard Rubber, Brass, or Similar Material, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a side elevation of a machine embodying my invention. Fig. 2 represents an end elevation of the machine shown in Fig. 1. Fig. 3 is a plan view of the same machine. Fig. 4 is a plan view of one end of the same machine, the upright pillar 36 being removed and the remaining parts sectioned on the line A A of Fig. 1. Fig. 5 is an elevation in section of some of the parts shown in Fig. 4, the section being made on the line B B of Fig. 4. Fig. 6 is a plan view of certain parts of the same machine viewed from the under side. Fig. 7 is a detail of the turn-table and sliding plate upon which is mounted the pillar 36. Fig. 8 is an elevation of the same detail in section, the section being made on the line C C of Fig. 7.

Hitherto articles of the class described have been polished by bringing their surfaces to bear upon rotating pads of cloth, called "buffers," the article that is being polished being made to rotate at the same time whenever possible. This has commonly been done by fixing the article, which for convenience I shall assume is an atomizer-tube, upon a rotating spindle, which, being connected by a flexible cable with a source of power, may be held in the hand and applied to the surface of the buffer at varying angles and with more or less pressure, as is desired. It is important that the operator should not hold the tube at rest upon the surface of the buffer, but should keep it always in motion; otherwise scratches or streaks are liable to be produced in the surface of the article. The necessity of keeping the article continually in motion on the surface of the buffer, pressing it hard against it in different directions and angles, involves considerable exertion and is no inconsiderable tax upon the physical powers of the operator, besides being relatively slow and expensive.

The objects of my invention are to provide an improved machine and one in which several articles can be polished upon one buffer at the same time and coincidently, if desired, with a like number of other articles of different form.

Referring to the drawings, it will be seen that my machine consists in the main of a buffer 18 and of a series of upright rotating spindles 2, so mounted that they are movable toward and from the buffer by a lever 47. The peculiar motions which the several parts take on when the machine is in operation and their relations one to another and the construction and method of operation of the machine in general will be apparent from the more specific description which I shall now give.

The main shaft 4, (see Fig. 1,) on which is mounted a driving-pulley 5, is journaled in bearings 6, supported from the fixed bed 9 of the machine, and is also journaled in a bearing 7, mounted on a plate 8, which is adapted to slide on the bed 9 in a direction toward and from the bearings 6. This plate 8, which I shall for the sake of clearness refer to as the "sliding bed" in distinction from the fixed bed 9, on which it rests, is kept in place by strips 30, that project over its edges, being fastened to the fixed bed 9 and by the screw 10, by which its position relative to the fixed bed and the bearings 6 carried thereby may be adjusted. The main shaft carries in addition to the driving-pulley 5 a pulley 11, from which power is transmitted to the pul-15 on an auxiliary shaft 12, hereinafter to be described, and also a cam 13 and one member of a clutch 14. The clutch member abuts against the journal 7 on one side, and a collar 16 on the shaft 4 abuts against that journal on its other side, so that the shaft 4 is not free to slide in its bearings 7 in either direction. The portion of the shaft 4 which passes through the two bearings 6 and which carries the cam 13 and pulleys 11 and 5 be-

tween those bearings has a spline 17, by which the cam and pulleys are connected to it and rotate with it, the shaft being free to slide through them and through the bearings 6. It will now be evident that when the sliding bed 8 slides on the fixed bed 9 the journal 7, and with it the shaft 4, moves toward or from the bearings 6, the shaft sliding through those bearings and through the pulleys and cam as much as is necessary.

The buffer, which may be of any suitable construction, is in the machine represented in the drawings mounted on a shaft 19, which runs at right angles to the shaft 4 and is journaled in two bearings 20, supported from any convenient base 21. In the drawings this base is represented as a bench independent of the previously-described parts of the machine, I having found this to be a convenient construction. It will be obvious, however, that the frame of the machine might be designed to support the bearings of this shaft, if desired. The shaft 19 is driven by a pulley 22, mounted upon it, which may be connected with any convenient source of power. This shaft also carries a circumferentially-grooved collar 23 into the groove in which fit the prongs of a fork 24. This fork constitutes one end of a rocker-arm 25, which is pivoted at the point 26 on the frame supporting the shaft 19. Play room is provided between the bearings of the shaft, so that when the rocker-arm is oscillated the shaft 19 moves to and fro in the direction of its axis, giving to the buffer which it carries a corresponding motion. The other end of the rocker-arm 25 is connected by a rod 27 with a roller 28, that rides on the cam 13 on the shaft 4. A spiral spring 29, strung on the rod 27, keeps the roller in contact with the cam. It will now be understood that rotation of the shaft 4 will, through the cam 13, rod 27, and rocker-arm 25, cause a reciprocating sidewise motion to be given to the buffer 18, the direction of which will be transverse to the travel of the sliding bed 8, the buffer meanwhile rotating upon its axis, being driven by the pulley 22.

Mounted on the sliding bed 8 is a circular plate 31, (see Figs. 1, 4, 5, 7, 8,) the shape of which in cross-section is shown in Fig. 8. This plate constitutes a turn-table fitting within and adapted to turn in a circular depression in the bed 8, as shown in Fig. 5. It is held in place by a series of segmental strips 32, which fit into the groove 33 in its edge and are fastened down upon the bed 8. On the upper side of the turn-table 31 is another plate 34, which rests upon the turn-table and is adapted to slide to and fro thereon. For convenience of construction this sliding plate is sunk somewhat below the surface of the turn-table; but it will be obvious when the functions of the parts are understood that any suitable construction may be employed which enables this plate to be moved at pleasure toward one side or toward another side of the center of the turn-table. This sliding plate 34 is kept in place by any suitable means, the means represented in the drawings being two strips 35, fastened to the turn-table, which the sliding plate prevents from being lifted.

The sliding plate 34 has mounted upon it an upright pillar 36, the upper end of which has flanges 38, Figs. 1 and 3, which serve as ways to guide the up-and-down motion of tables 37, which are supported and caused to move up and down by the rods 39, as will hereinafter be described. These tables each carry a row of rotating spindles 2, adapted to hold the articles to be polished. The spindles are connected by intermeshing spur-gears 40, one mounted on each spindle, which are driven by a spur-gear 41 on an upright driving-shaft 42, hereinafter to be described.

The sliding plate 34 carries at each end a journal-bearing 43, in which is a short shaft 44, (shown in dotted lines in Fig. 1,) which carries at its outer end a clutch member adapted to constitute one member of the clutch 14. The other end of each shaft 44 carries a crank-arm 45, having a crank-pin 46, to which is connected the rod 39, that supports and controls the position of the tables 37. The length of the crank-arm 45 may be varied at pleasure by adjusting the position of the pin 46 in that arm, which may be done by any suitable means. In the drawings the crank-pin 46 is represented as movable within a groove 46^a (see Fig. 3) in the crank-arm, a nut being provided by which the pin may be made fast in any desired position in that groove. It will now be seen that if the turn-table 31 be turned so that the sliding plate 34 lies in the direction of the main shaft 4 and if that plate be then slid toward the member of the clutch 14 which the shaft 4 carries, the clutch member on the shaft 44 will engage therewith, the shaft 44 will be rotated, and with it the crank 45, and a reciprocating up-and-down motion will be imparted to that one of the tables 37 which is on the side of the pillar toward the main shaft 4, the other table 37 remaining stationary, because the clutch member by which it would be driven, if at all, is not in engagement. (See Fig. 1.) The length of this up-and-down travel of the table depends upon the length of the crank-arm 45. When the sliding plate 34 is slid back away from the main shaft 4 and the clutch 14 is thereby opened, this up-and-down motion ceases. If then the turn-table be rotated so as to bring the other shaft 44 opposite the clutch 14 and the plate 34 be again slid toward the main shaft, the other table 37 will receive a reciprocating up-and-down motion, the extent of which depends upon the length of its crank-arm 45, which may or may not, at the pleasure of the operator, be the same as the length of the first crank-arm. A lever 47, having its fulcrum at a point 3 stationary on the turn-table 31, is pivoted at a point 48 on

the upright pillar, which, it will be remembered, is carried on the sliding plate 34. By means of this lever the sliding plate 34 may be slid in either direction by the hand of the operator in order to bring into or out of connection with the main shaft 4 either of the shafts 44, whichever may happen to be turned toward the clutch 14.

I have already stated that the spindles 2 are rotated through a train of gearing 40 41. Each gear 41 is mounted on a vertical shaft 42, to which it is keyed by the spline 49 and on which it is free to slide up and down with the table 37. This shaft 42 is rotated continuously when the machine is working, whether the table 37 to which it belongs is in operation or not, through a train of bevel-gears (see Fig. 5) leading from the auxiliary shaft 12, this auxiliary shaft being driven from the main shaft 4 by any suitable means. (See Fig. 1.) In the machine represented in the drawings the shaft 12 is journaled in bearings 50 on the under side of the fixed bed 9 (see Figs. 1 and 6) and is driven by the pulley 15. It is also journaled in the bearing 51 on the under side of the sliding bed 8. The shaft 12 carries a yoke-piece 53, Figs. 6, 5, the arms of which are spread so as to pass around the bevel-gear 54 on the end of that shaft and come together again to form the bearing 55, on which is journaled the two-faced horizontal bevel-gear 56, which meshes with the gear 54. The bed 8 and the turn-table 31 have openings cut through their center portions, which make a hole or central opening into or through which the double-faced gear 56 projects, Fig. 5, and where its upper gear-face meshes with bevel-gears 57, which are fixed to two short shafts 58, journaled in the upper sliding plate 34. The other ends of these shafts 58 carry bevel-gears which transmit their rotary motion to the gears 60 on the upright shafts 42, thus rotating the spindles 2. A construction of the journal-bearings for the shafts 58 which I have found suitable is represented in the drawings, in which the lower half of the bearing is represented as sunk into the plate 34, the upper half of the bearing being a separate cap-plate 61, screwed down upon the plate 34.

It will be obvious that when the plate 34 is slid toward or from the clutch 14 the group of bevel-gears which it carries will be moved correspondingly, together with the gears 56 and 54. The shaft 12 passes loosely through the base 62 of the yoke 53 and turns freely therein. At its other end this shaft is provided with a long spline 63, so that when the plate 34, carrying with it the bevel-gears 56 and 54, is moved toward or away from the clutch 14 the shaft 12 will slide through the driving-pulley 15, mounted upon it, and will likewise slide through that pulley whenever the position of the sliding plate 8 is adjusted. The central openings through the turn-table 31 and the bed 8 are elongated to allow room for the travel of this group of gears when the plate 34 is moved to and fro.

It will now be understood that when the turn-table 31 is rotated the sliding plate 34 upon it will rotate with it; that the pillar 36, the tables 37, spindles 2, driving-shafts 42 and 58, and journal-standards 43, which are all supported upon the turn-table, will rotate with it; that the gears 57 will likewise rotate with the turn-table, but will nevertheless remain always in mesh with their driving-gear 56. From this it follows that whatever the position of the sliding plate 34, whether out or in, and whatever the position of the turn-table the spindles 2 will always be rotating, so long as their driving-shaft 12 is connected with the power.

The adjustment and operation of my machine are as follows: The turn-table having been turned to such a position that one of the series of spindles 2 is presented to the surface of the buffer, in which position the shaft 44 will be in position to engage with the clutch member 14 on the main shaft 4, the length of the crank-arm 45 is adjusted, so that when in operation an up-and-down motion of the desired extent will be imparted to the series of spindles opposite the buffer. The position of the sliding bed 8 is then adjusted and fastened in position on the fixed bed 9, so that when the plate 34 has been slid toward the main shaft and the clutch members 14 are in engagement the articles to be polished, mounted on the spindles, will be pressed against the surface of the buffer. Then the sliding plate 34 is returned to its normal position in the center of the turn-table. The operator places the articles that are to be polished upon the row of spindles 2, grasps the lever 47, and by that lever moves the plate 34 and the parts which it carries, including the row of spindles, toward the buffer. As the rotating spindles approach the buffer the clutch members 14 engage, and the crank 45 begins to move the spindles up and down. As the lever is pushed farther over, the articles come in contact with the surface of the buffer and are by the lever pressed against it as hard as is desired until further motion of the lever is stopped by the seating of the clutch members 14. While being pressed against the surface of the buffer the articles are subjected to a combination of motions which quickly produces a high and enduring polish, the fundamental element of those motions being the surface of the buffer as it rotates about its axis, to which are added the horizontal reciprocating motion of the buffer, the vertical reciprocating motion of the spindles, and the rotation of the spindles upon their axes. The articles having received a sufficient polish, the lever 47 is drawn back. The spindles are thereby withdrawn from the surface of the buffer, the clutch members 14 are disengaged, and the up-and-down motion of the spindles ceases.

The operator, who has in the meantime while the polishing was in progress placed other articles on the other series of spindles, rotates the parts on the turn-table 31, and the second shaft 44 is presented to the clutch 14. This new lot is polished as the first lot was, the first lot being removed and a new one substituted on the spindles it occupied while the polishing of the second lot is in progress.

If it is desired to polish articles of different length at the same time—as, for example, two sizes of atomizer-tubes, both adapted to fit the same atomizer—one of the cranks 45 may be set at a length proper for one sort and the other at a length proper for the other sort of articles, thus permitting rapid execution of an order involving the finishing of parts having several sizes. The tubes to be polished are mounted on the spindles 2 while the latter are rotating, where they are held by friction, I having found that a better hold is obtained by having the spindle rotate when the article is put on or taken off.

As the surface of the buffer wears or as adjustment is required to give a greater or less penetration into the rotating surface of the buffer, the position of the sliding bed 8 may be moved, by means of the screw 10, to suit the needs of the occasion.

In order to make sure that the spindles shall when the lever 47 is pushed over as far as it will go penetrate to the precise depth desired into the rotating surface of the buffer and not penetrate too deeply, I have so arranged the parts that the seating of the movable member of the clutch 14 upon the other member constitutes a stop to limit the travel of the plate 34 and spindles 2, carried by it, and I have made the clutch 14 abut against the journal-bearing 7 of the driving-shaft 4, which carries the stationary member of the clutch, and have mounted that journal-bearing upon the sliding bed 8. It will be understood, therefore, that whatever may be the position to which the sliding bed 8 has been adjusted to compensate for wear of the buffer or to provide a greater or less limit of penetration of the spindles into the rotating surface of the buffer the workman in operating the machine can always push upon the lever 47 until it refuses to move farther, confidently relying upon the machine itself automatically to stop the penetration when the desired depth has been reached. This very desirable result, which gives uniformity of action and which would be difficult of attainment were the operator obliged to rely upon his own judgment each time, I attain by mounting the bearing 7, against which the stationary member of the clutch 14 abuts, upon the same bed 8 which supports the stationary end of the lever 47 and the sliding plate 34, and by making the driving-shaft of the clutch likewise fixed in position relative to the bed 8, so that when the bed 8 is moved for adjustment the driving-shaft 4 moves with it, and providing means by which power may always be imparted to this shaft 4 in whatever position it may be and notwithstanding its sliding capabilities.

The device for securing the turn-table in operative position is shown in Figs. 2, 3, and 6. Projecting down from the sliding plate 8 are two ears 63, Figs. 2 and 6, to which are pivoted a spring-pressed treadle 64, Figs. 2 and 3, which operates a locking-bolt 65, Fig. 2, pivoted thereto and projecting through a guide-hole 66, Fig. 6, in the plate 8 and adapted to engage with one of the bolt-holes 67, Fig. 8, in the turn-table to lock it in position for operating the machine.

While I have described in the foregoing specification one form of machine which is an embodiment of my invention and which is the best form that I at present know of, I do not limit myself to the specific forms of construction shown or described, it being apparent that equivalent constructions working on the same principle to accomplish the same functions might be made by the skilled mechanic without the exercise of invention.

I claim—

1. In a machine of the class described, the combination of a buffer; a spindle or spindles adapted to hold articles to be polished; a support for those spindles; means to rotate the spindles; a crank-arm in connection with that support, adapted to impart a reciprocating motion to the spindles, in the direction of the axes of the spindles; means to vary the length of the crank-arm; means to actuate that crank; and means to cause the spindles and the polishing-surface of the buffer to be brought into and out of proximity with each other.

2. In a machine of the class described, a main shaft; a buffer; an eccentric upon the main shaft; connections between the eccentric and the buffer to move the buffer axially while it rotates; a plurality of spindles; a table to support the spindles; a standard to support the table, the table having a sliding engagement with the standard; a second eccentric driven by the main shaft and giving a reciprocating movement to the table and the spindles; means to rotate the buffer and the spindles, all organized to give to the article to be polished the resultant of the rotation of the buffer and spindle in planes crossing each other and the reciprocation of the buffer and spindle in planes crossing each other.

3. The buffing-machine above described, made up of a frame; a main shaft in bearings on that frame and carrying one member of a clutch at one end; a supplementary shaft mounted upon a turn-table plate, and carrying the other member of that clutch; that turn-table plate sliding in ways in the frame of the machine and in line with the main shaft and carrying a standard; that standard; a spindle-table having a sliding engagement with the standard and carrying a spindle or spindles; that spindle; an upright shaft car-

ried by the turn-table and having a sliding connection with the spindles and driving the spindles and driven by a sliding counter-shaft actuated by the main shaft; an eccentric on the supplementary shaft connected to the spindle-table; and a buffer; all organized so that rotation of the main shaft shall rotate and reciprocate the spindles simultaneously against the buffing-wheel.

4. In a machine of the class described, a buffer; a main shaft; a rocker-arm between the main shaft and the buffer, one end of which engages the buffer while the other is connected to an eccentric on the main shaft; that eccentric; a spindle or spindles mounted on a table; a standard supporting the spindle-table, the said table having a sliding engagement with said standard; that standard; a second eccentric on the main shaft; a connecting-rod between the eccentric and the sliding table; and a sliding connection between the main shaft and the spindle or spindles to actuate the spindles.

5. In a machine of the class described, a buffer; a main shaft having a clutch member at one end; connections between the main shaft and the buffer to reciprocate the buffer while it rotates; a turn-table platform sliding in ways in the frame of the machine; a standard mounted upon the turn-table; a table having a sliding engagement with the standard and carrying a spindle or spindles; the spindle so carried; a shaft having a clutch member at one end and carrying an eccentric; a connection between the eccentric and the spindle-table; a shaft having a sliding connection with the spindles and connecting at its lower end with the main shaft; all organized and arranged to cause the clutch members on the two shafts to engage and disengage at the will of the operator and to simultaneously rotate and reciprocate the spindle across the line of travel of the buffer.

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