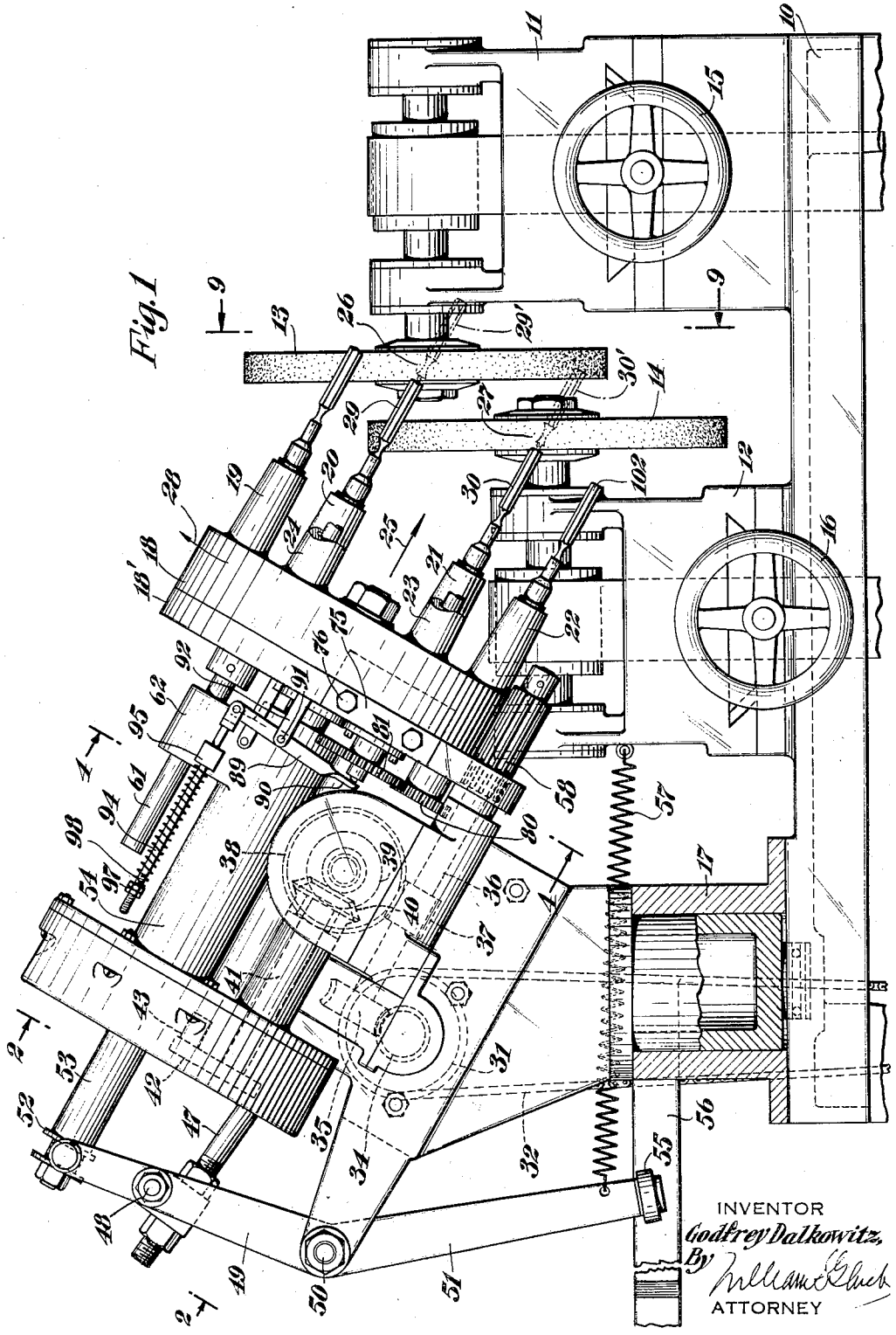
Aug. 11, 1936. G. DALKOWITZ 2,050,422

BUFFING MACHINE

Filed July 27, 1929 5 Sheets-Sheet 1

Fig. 1



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BUFFING MACHINE

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Fig. 2

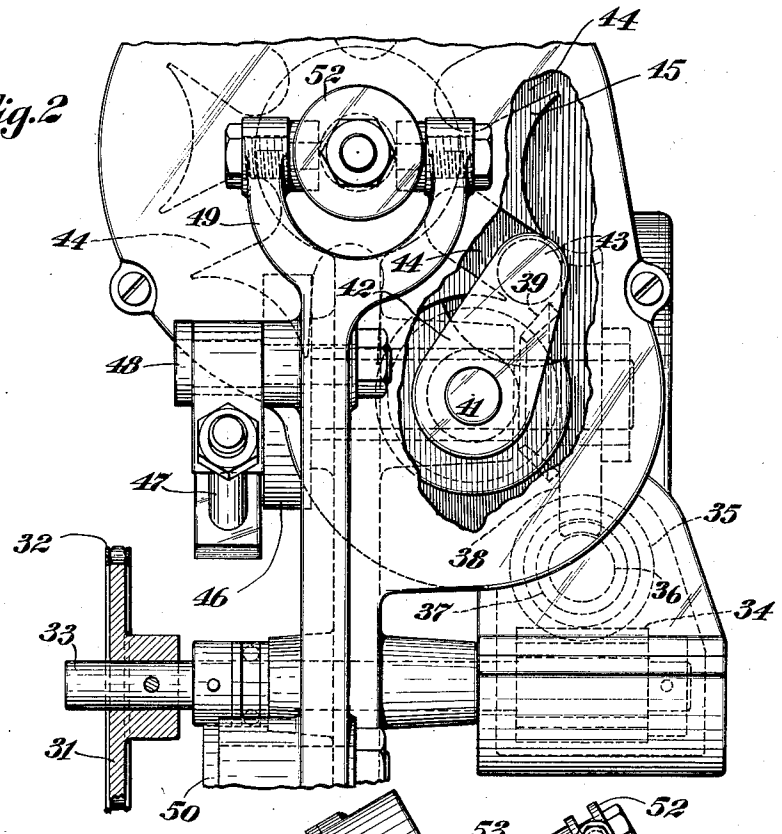
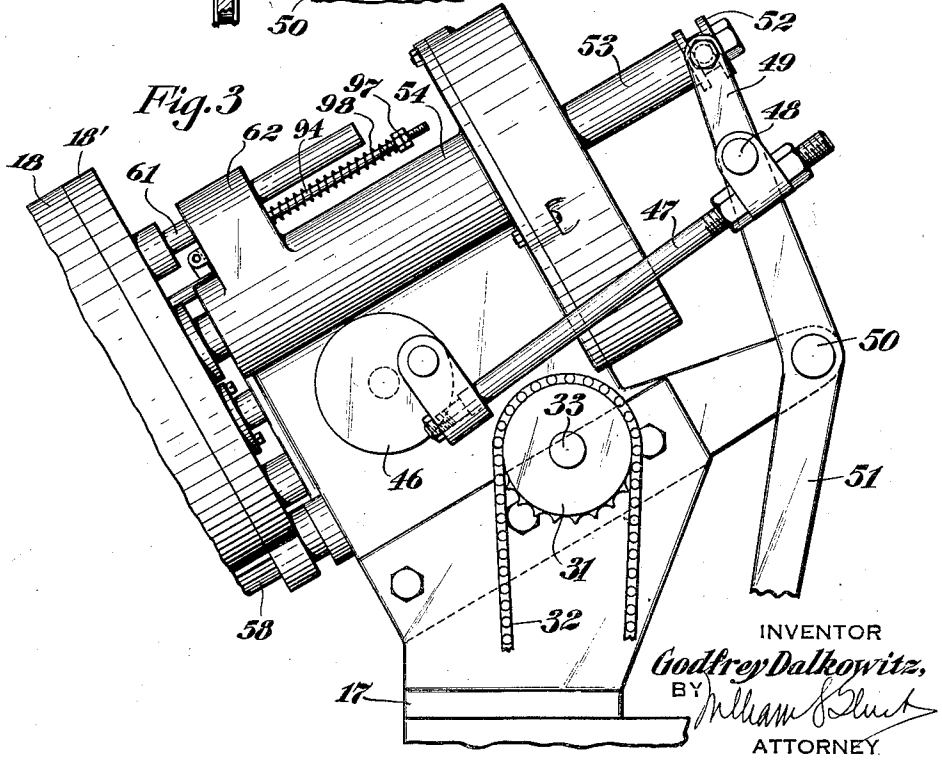


Fig. 3



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BUFFING MACHINE

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Fig. 5

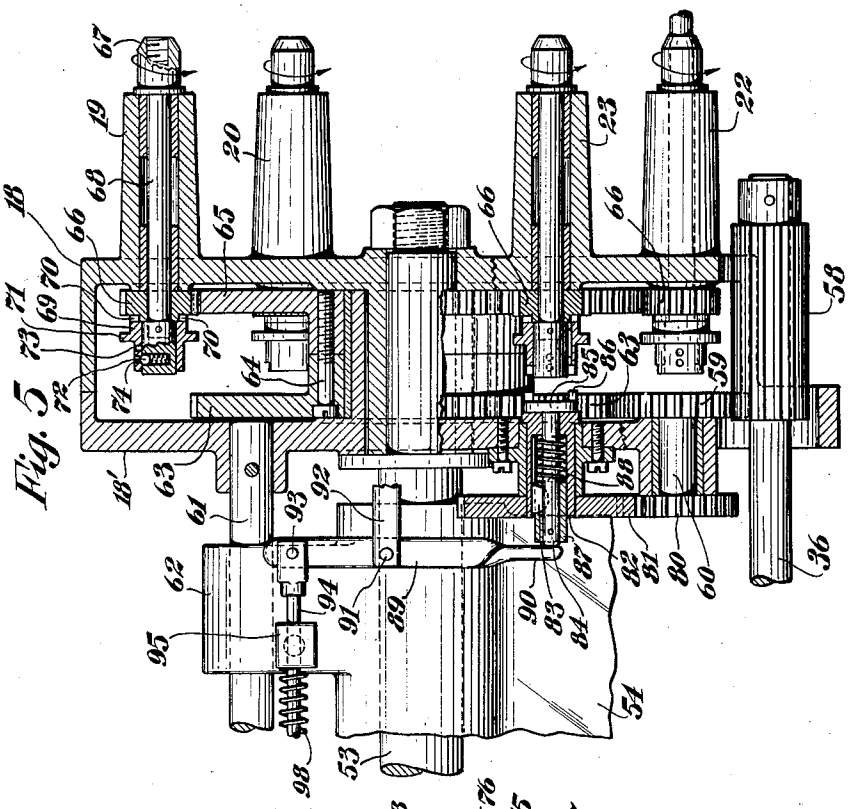
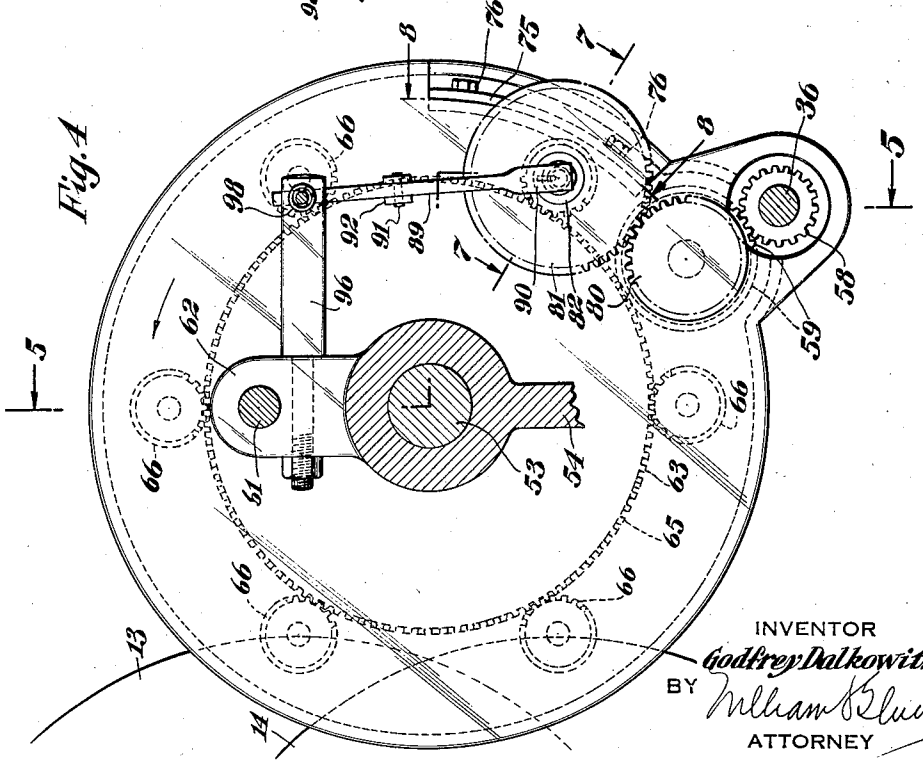


Fig. 4



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BUFFING MACHINE

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Fig. 6

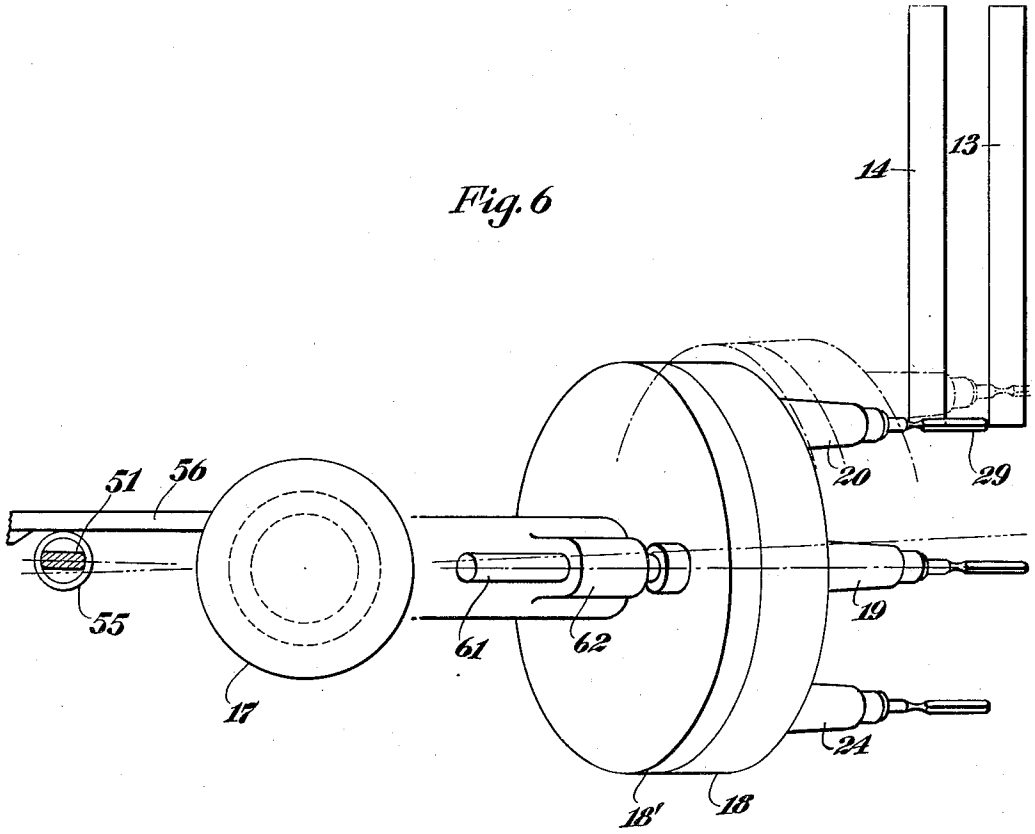


Fig. 7

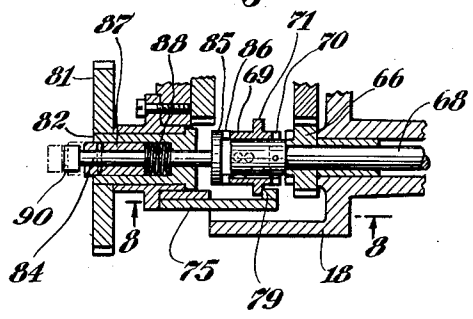
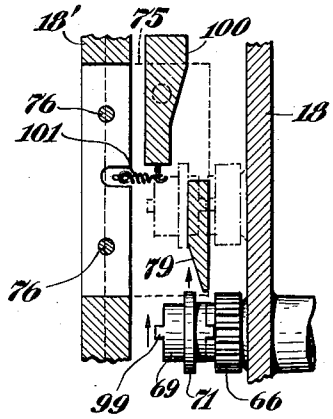


Fig. 8



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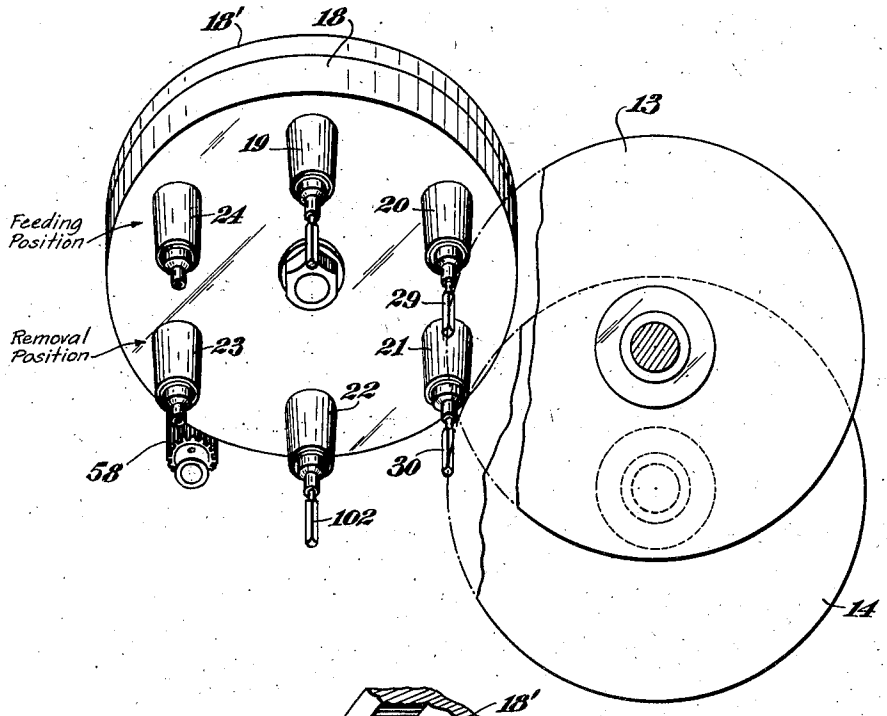
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BUFFING MACHINE

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Fig. 9



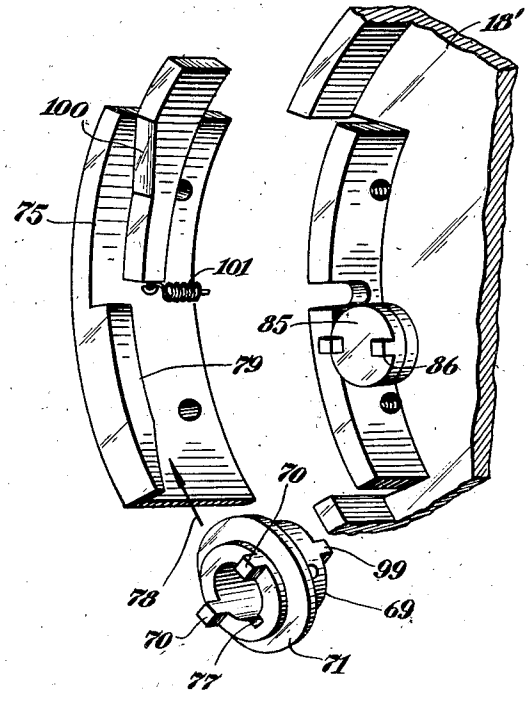


Fig. 10

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UNITED STATES PATENT OFFICE

2,050,422

BUFFING MACHINE

Godfrey Dalkowitz, New York, N. Y., assignor to American Safety Razor Corp., New York, N. Y., a corporation of New York

Application July 27, 1929, Serial No. 381,573

39 Claims. (Cl. 51—108)

My present invention relates generally to buffing machines, and has particular reference to an improved machine for buffing articles such as handles in large quantities and in rapid succession.

Although I have herein illustrated and shall hereinafter describe a buffing machine designed primarily for employment with metallic razor-handles, nevertheless it will be understood that as to certain phases of my invention it is not limited to the buffing of such articles. Furthermore, many phases of my invention are not even restricted to buffing per se, but relate generally to the treatment of articles analogously to the subjection thereof to buffing wheels.

A general object of my invention is to provide a buffing machine wherein a series of articles such as razor-handles may be efficiently and rapidly subjected in succession first to one buffing wheel and then to another. For example, the first buffing wheel may serve to treat the handles for the purpose of initially removing the larger irregularities and the second buffing wheel may serve in the nature of a polishing wheel or the like.

A particular feature of my invention lies in so constructing a machine that both buffing wheels are simultaneously operative, one with one handle and the other with a second handle. In other words, as each successive handle is subjected to the first buffing wheel, the handle immediately preceding is automatically subjected to the second buffing wheel.

An important object of my invention is to provide a machine of the foregoing character wherein the parts are so arranged and constructed that a maximum degree of compactness is achieved and that the operation is feasible and satisfactory by an operator fixedly positioned at one side of the machine.

In accordance with the foregoing object, it is a particular feature to arrange a pair of buffing wheels in such staggered relationship with respect to a carrier for the articles to be treated that the foregoing advantages, and others, are achieved in a minimum of space and without the necessity for the operator to move from a single operating position alongside of the machine.

In the embodiment herein chosen for illustration, the carrier for the articles to be treated is in the form of a rotatable chuck-head provided with a series of spaced and rotatable chucks adapted respectively to engage the razor handles.

An important feature of my invention lies in providing mechanism for intermittently adjusting the chuck-head so as to subject the handles in the contemplated manner to the buffing wheels; and in providing means for enabling the operator expeditiously to remove completely treated handles and apply new untreated handles to the chuck-head at predetermined times and in a peculiarly efficient manner at what may be termed a discharge or feeding position.

Another feature of my invention, having particular reference to the treatment of articles such as handles, lies in providing mechanism for automatically moving the handles in such a manner, as they are subjected to the wheels, that the maximum efficiency of buffing is achieved. For example, the handles are not only axially reciprocated across the peripheries of the buffing wheels respectively, but they are also shifted laterally in a predetermined manner at predetermined times.

For the attainment of the foregoing objects and such other objects as may hereinafter appear or be pointed out, I have constructed a device embodying the features of my invention and illustrated in the accompanying drawings wherein—

Figure 1 is a side view of a machine embodying the features of my invention and showing a chuck-head in what may be termed a normal retracted position, two of the chucks being broken away for the sake of clearness;

Figure 2 is a rear end view upon an enlarged scale taken substantially along the line 2—2 of Figure 1 and certain parts being broken away;

Figure 3 is a view of the rear portion of the machine taken in a direction diametrically opposite to that of Figure 1;

Figure 4 is a cross-sectional view taken substantially along the line 4—4 of Figure 1;

Figure 5 is a cross-sectional view taken substantially along the line 5—5 of Figure 4;

Figure 6 is a plan view of the chuck-head shown in relationship to the buffing wheels and mainly diagrammatic;

Figure 7 is a detail cross-sectional view taken substantially along the line 7—7 of Figure 4;

Figure 8 is a cross-sectional view taken substantially along the line 8—8 of Figure 7 which corresponds to the direction 8—8 indicated on Figure 4;

Figure 9 is a view taken substantially along the line 9—9 of Figure 1; and

Figure 10 is an enlarged exploded view showing the details of the mechanism of Figures 7 and 8.

Mounted upon a suitable base 10 I provide a pair of standards 11 and 12 each of which is suit-

ably constructed to constitute a bearing for a buffing wheel. Thus, the standard 11 serves as a bearing for the buffing wheel 13 and the standard 12 serves as a bearing for the buffing wheel 14. In the illustrated embodiment, wheel 13 is the first one to which the handles are successively subjected.

The buffing wheels are so mounted, and are accurately adjustable as by means of the control handles 15 and 16 respectively, that a staggered relationship exists. In the particular form of machine herein illustrated, the wheels 13 and 14 are substantially of equal diameter and are mounted to rotate in adjacent vertical planes about axes which are superposed.

Upon a third standard 17 carried by the base 10 I provide the chuck-head 18 adapted to carry a series of handles. More particularly, the chuck-head 18 is provided with a set of circumferentially arranged and equally spaced rotatable chucks 19–24 inclusive. The chuck-head 18 is substantially circular and is not only rotatable about its axis, but is shiftable or reciprocable in the direction of its axis as indicated by the arrow 25 of Figure 1. It is particularly to be noted that this axis of rotation and reciprocation is inclined with respect to the planes of the wheels 13 and 14. More accurately stated, this axis is parallel to a plane tangent to both of the wheels 13 and 14 and substantially perpendicular to the line joining the points of tangency. Thus, in Figure 1, the tangent plane referred to is parallel to the sheet of drawing and is tangent to the wheels 13 and 14 at approximately the points of tangency 26 and 27 respectively.

I provide means for intermittently rotating the chuck head 18 in the direction of the arrow 28 of Figure 1, which is a counterclockwise direction as viewed in Figure 4. Furthermore, the axis of the chuck-head is so positioned in front of the wheels 13 and 14 that two handles will always be respectively subjectable to said wheels. Thus, in Figure 1, the chucks 20 and 21 are in positions capable of subjecting the handles 29 and 30 carried thereby respectively to the wheels 13 and 14 respectively. (When the chuck-head 18 advances, in Figure 1, the handle 29 assumes the dot and dash position 29', and the handle 30 assumes the dot and dash position 30'.)

The means for causing the step by step rotation of the chuck-head 18 is shown most clearly in Figures 1 and 2. A source of power (not shown), such as a motor, drives a sprocket wheel 31 as by means of a chain or the like 32. The wheel 31 is mounted upon a shaft 33 which carries at its forward end a worm 34. The latter meshes with and drives a worm wheel 35 mounted upon a shaft 36 parallel to but offset from the axis of the chuck-head as a whole. The shaft 36 carries a worm 37 which drives a worm wheel 38 mounted upon a shaft substantially parallel to the shaft 33 previously referred to. Mounted upon the latter shaft is a beveled gear 39 meshing with and driving a beveled gear 40 on the end of a shaft 41 parallel to the axis of the chuck-head. On the rear end of the shaft 41 is a crank 42 forming the driving element of a Geneva movement shown most clearly in Figure 2. Thus, the crank 42 carries a pin 43 adapted to engage successively in the recesses 44 of the Geneva gear 45. In Figure 2, the crank 42 is rotating clockwise and the pin 43 is on the point of leaving one of the recesses 44. The chuck-head will thereby be retained stationary, so far as rotation is concerned, until the pin 43 reaches the recess 44 which in Figure 2 is the lowest recess on the wheel 45.

The movement which this Geneva arrangement imparts to the chuck-head 18 is sufficient to advance each of the chucks 19—24 accurately to the position previously occupied by adjacent chucks respectively. Thus, in Figure 1, the chuck 19 would be advanced into the position occupied in this figure by the chuck 20, etc.

The reciprocation of the chuck-head 18 is effected by means of a crank wheel 46 mounted upon the same shaft which carries the worm gear 38 and the beveled gear 39. A connecting rod 47 extends rearwardly from the crank wheel 46 and is pivoted at 48 to a bell-crank lever 49 whose fixed pivot 50 is integral with the standard 17. The connecting rod 47 is pivoted to the upper arm of the lever 49 and the lower arm 51 serves a function which will hereinafter be pointed out.

The upper end of the lever 49 is constructed as a yoke which engages in a sleeve 52 loosely carried upon the rear end of the main axial shaft 53 of the chuck-head 18. The shaft 53, and with it the head 18, is journaled within the large bearing 54 forming the upper portion of the standard 17 and unreciprocable.

The lower arm 51 of the bell-crank lever 49 is provided at its lower end with a cam follower 55 adapted to travel along a cam 56 and firmly held in engagement with the cam 56 by the spring 57 extending from the fixed standard 12 to the lower portion 51. The engagement of the follower 55 with a suitably prepared cam surface upon the cam 56 is enabled to effect a lateral shifting of the entire chuck-head, its bearing 54, and all parts carried thereby at predetermined times, by virtue of the fact that the standard 17 is rotatably mounted upon the base 10 as shown most clearly in Figure 1. This shifting of the chuck head laterally is indicated in Figure 6 of the drawings.

Each of the chucks 19—24 inclusive is threaded in such a manner as to be capable of threaded engagement with any one of the handles to be treated. Furthermore, I provide mechanism for normally rotating the chucks in a direction which enhances the firmness of this threaded engagement during the periods of treatment of the handles. In accordance with a particular feature of my invention, I provide means for momentarily discontinuing the rotation of each chuck and for a short time rotating it in the opposite direction as it approaches a discharge or feeding position. This position is occupied by the chuck 23 in Figure 1 and reference is now directed to Figures 4 and 5.

The normal rotation of the chucks is effected by means of the gear 58 mounted upon the shaft 36 and meshing with a gear 59 within the head 18. The gear 59 is mounted upon a shaft 60 journaled within the rear unrotatable portion 18' of the head 18. The portion 18' remains locked against rotation by means of the slidable engagement of the guide rod 61 extending rearwardly from the portion 18' through a suitable bearing 62 integrally formed upon the fixed portion 54. The guide rod 61 allows the entire head 18, including the unrotatable portion 18' and all the parts and gears carried thereby to reciprocate axially.

The gear 59 meshes with a relatively large gear 63 axially mounted within the head 18, and the gear 63 is joined, as by bolts 64, to a similar gear 65 mounted adjacent to the front face of

the head 18. The gear 65 is, in effect, a sun-gear meshing simultaneously with a plurality of satellite gears 66 associated with each chuck.

In Figure 5, I will describe in greater detail the chuck 19 and the description thereof will suffice for the others. The internally threaded head 67 is mounted upon a spindle 68 which extends into the head 18. One of the gears 66 is loosely mounted upon the rear end of the spindle 68, and behind the gear 66 is a clutch disc 69 splined to the enlarged rear end of the spindle 68. The clutch disc 69 is provided with forwardly disposed clutch teeth 70 adapted to engage with similar complementary teeth arranged on the rear face of the gear 66. The clutch disc 69 is further provided with an annular flange 71 whose function will be hereinafter explained.

The disc 69 is adapted to be shifted axially along the spindle 68 from the forward position of Figure 5 to a slightly rearward position wherein the spring-pressed detent 72 engages within the recess 73 of the disc 69 instead of within the recess 74 as shown in Figure 5.

When the clutch disc 69 is positioned as in Figure 5, the spindle 68 is rotated in the normal direction by means of the main gear 65, which transmits its motion through the satellite gear 66, the clutch teeth 70 and the disc 69, to the spindle 68.

To discontinue the rotation of each successive chuck as it approaches the position of chuck 23, I provide cam means for engaging the flange 71 and shifting the clutch disc 69 rearwardly, this cam means being operative only as the chuck travels from the position of the chuck 22 to that of the chuck 23. The cam which accomplishes this is carried on the interior of a plate 75 attached to the rear unrotatable portion 18' of the head 18 by means of bolts or the like 76. The plate 75 is shown from the interior thereof in exploded relationship with respect to the portion 18' to which it is attached, in Figure 10. In this figure, I have shown for illustrative purposes a clutch disc which may be assumed to be the disc 69 previously described advancing from the position of the chuck 22 into that of the chuck 23. The clutch teeth 70 previously described are clearly depicted in Figure 10, as well as the keyway 77 which serves to enable the splining of the disc 69 to the spindle 68.

As the disc 69 advances, in the direction of the arrow 78, the flange 71 encounters the cam surface 79 provided on the plate 75, which cam surface functions to shift the clutch disc 69 rearwardly, viz., to the right in Figure 10, which is toward the rear portion 18'. As soon as this has been accomplished, the chuck ceases to rotate and makes it feasible for the operator to grasp the handle carried by this chuck and hold it against further rotation.

While the operator is thus holding the handle, means presently to be described becomes operative to rotate the chuck for a short period in the opposite direction, thereby, in effect, causing an unscrewing of the handle from its chuck.

The means for causing this reversal of rotation is shown most clearly in Figures 4 and 5. Mounted on the rear end of the shaft 60 is a gear 80 meshing with a gear 81, the latter being mounted upon a sleeve 82 axially arranged behind the discharge position of the chuck 23. Within the sleeve 82 and splined to the latter as by means of the key 83 is a spindle 84 carrying at its forward end a clutch disc 85 provided with the clutch teeth 86. The rear end of the spindle 84 is pinned to a sleeve element 87 adapted to compress a spring 88 when shifted axially to advance the disc 85.

A floating lever 89 has its lower end 90 bearing against the rear end of the spindle 84. The midportion of the lever 89 is pivoted as at 91 to a bar 92 fixedly carried by the unrotatable portion 18' of the chuck-head 18. The upper end of the lever 89 is pivoted as at 93 to the forward end of a rod 94 journaled within a bearing 95, the latter being carried on the end of an arm 96 attached to the bearing 62. The rod 94 extends rearwardly through the bearing 95 and is provided at its rear end with a collar 97 (see Figure 3). Between the collar 97 and the bearing 95 is a compression spring 98 which tends normally to draw the rod 94 rearwardly.

As a result of the foregoing arrangement, the parts are normally in the position of Figure 5, but when the chuck-head is axially advanced, i. e., moved to the right as viewed in Figure 5, the lever 89 is pulled at the point 91 to the right along with the chuck-head. If the spring 98 were absent, the lever 89 would move parallel to itself, but by virtue of the action of the spring 98, the advancement to the right of the midportion 91 of the lever 89 causes the lever to pivot around the point 93, and thereby to press against the spindle 84 and advance the clutch disc 85.

In Figure 10, the clutch disc 85 provided with the clutch teeth 86 is clearly visible in its normal position. When advanced, the teeth 86 engage with the clutch teeth 99 mounted on the rear face of the disc 69, thereby causing the latter to rotate. This last-mentioned rotation is in the opposite direction from the normal rotation because of the interposition of an additional gear between the main driving gear 58 and the clutch disc 69.

The subsequent movement of the clutch disc 69 from the discharge position into the next position (which is that occupied by the chuck 24 of Figure 1) reestablishes the normal positioning of the disc 69 by virtue of the fact that the flange 71 bears against the surface 100 provided on the plate 75. For obvious reasons, the surface 100 is yieldably held in position by means of the spring 101 so that no damage will occur during the reengagement of the teeth 70 with the corresponding teeth of the gear 66.

The operation of the apparatus will be clear from the description given. Thus, referring to Figure 1, the chuck-head 18 is in normal retracted position, the chucks 19, 20, 21, 22, and 24 are rotating in the normal direction, and the chuck 23 is momentarily not rotating in either direction. The crank wheel 46 presently becomes operative to advance the chuck-head in the direction of the arrow 25, thereby sweeping the handles 29 and 30 across the surfaces of the wheels 13 and 14 respectively. At the extreme end of this advancement, the cam 56 becomes operative to shift the entire chuck-head 18 from the full-line position of Figure 6 to the dot and dash position thereof, thereby forcing the rear attenuated portions of the handles 29 and 30 into firm buffing engagement with the wheels. The chuck-head is then returned to normal axial position and retracted into the normal position of Figure 1. Thereupon, the Geneva movement becomes operative to rotate the chuck-head 18 so that the handle 29 will assume the position previously occupied by the handle 30 and the other handles will advance accordingly. As the handle 102 of Figure 1 advances into the discharge posi-

tion, the chuck 22 ceases to rotate, and during the next advancement of the entire chuck-head 18, the handle 102, if grasped firmly, may be removed from the chuck 22 by virtue of the momentary reversal of rotation of this chuck. At the same time, a new handle is inserted into the chuck occupying the position of the chuck 24 of Figure 1, by merely applying it to the chuck, the normal rotation of the latter causing the threaded engagement to be effected.

It is to be noted that the momentary reversal of the chucks at the discharge position occurs during the advanced position of the chuck-head 18, this being the period of time substantially midway between rotative movements of the chuck-head.

The simplicity of operation will thus be evident. The operator stands or sits in front of the machine, facing it as in Figure 1, and merely applying fresh handles to the position of the chuck 24 and removing handles at the discharge position. No other attention is necessary, the machine operating entirely automatically to subject each handle in an efficient manner first to the wheel 13 and then to the wheel 14.

It will be obvious that changes in the details herein described and illustrated for the purpose of explaining the nature of my invention may be made by those skilled in the art without departing from the spirit and scope of the invention as expressed in the appended claims. It is therefore intended that these details be interpreted as illustrative and not in a limiting sense.

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

1. In a buffing machine, the combination with a pair of buffing wheels, of an adjustable endless carrier provided with a series of rotatable threaded chucks for a series of correspondingly threaded articles to be treated, means for intermittently adjusting said carrier to subject each successive article first to one of said wheels and then to the other thereof, and means for rotating each chuck during the buffing of the article carried thereby and for rotating the same in the opposite direction thereafter, at predetermined times, to permit removal of the article threaded thereon.

2. In a buffing machine, the combination with a pair of buffing wheels, of an adjustable endless carrier provided with a series of rotatable threaded chucks for a series of correspondingly threaded articles to be treated, means for intermittently adjusting said carrier to advance each chuck toward one wheel, then to the other wheel, and then to a discharge position removed from said wheels, and means for normally rotating said chucks in one direction and for momentarily and predeterminedly reversing said rotation as they arrive at said discharge position to permit removal of the articles threaded thereon.

3. In a buffing machine, the combination with a pair of buffing wheels, of an adjustable endless carrier provided with a series of rotatable threaded chucks for a series of correspondingly threaded articles to be treated, means for intermittently adjusting said carrier to advance each chuck toward one wheel, then to the other wheel, and then to a discharge position removed from said wheels, and means for normally rotating said chucks in one direction and for momentarily reversing said rotation as they arrive at said discharge position to permit removal of the articles threaded thereon, said last named means including a reversing mechanism and cam means at said discharge position for automatically subjecting the approaching chuck to said mechanism.

4. In a buffing machine, the combination with a pair of buffing wheels, of an adjustable endless carrier provided with a series of rotatable chucks for a series of articles to be treated, means for intermittently adjusting said carrier to advance each chuck toward one wheel, then to the other wheel, and then to a discharge position removed from said wheels, and means for normally rotating said chucks in one direction and for momentarily reversing said rotation as they arrive at said discharge position; said last-named means comprising a source of power, a gear train leading therefrom to said chucks, a reversing mechanism, and means at said discharge position for automatically disconnecting the approaching chuck from said gear chain and subjecting it to said reversing mechanism.

5. In a buffing machine, the combination with a pair of buffing wheels, of an adjustable endless carrier provided with a series of rotatable chucks for a series of articles to be treated, means for intermittently adjusting said carrier to advance each chuck toward one wheel, then to the other wheel, and then to a discharge position removed from said wheels, and means for normally rotating said chucks in one direction and for momentarily reversing said rotation as they arrive at said discharge position; said last-named means including a reversing mechanism and cam means at said discharge position for momentarily subjecting the approaching chuck to said mechanism.

6. In a buffing machine, the combination with a pair of buffing wheels, of an adjustable endless carrier provided with a series of rotatable chucks for a series of articles to be treated, means for intermittently adjusting said carrier to advance each chuck toward one wheel, then to the other wheel, and then to a discharge position removed from said wheels, and means for normally rotating said chucks in one direction and for momentarily reversing said rotation as they arrive at said discharge position; said last-named means comprising a source of power, a gear train leading therefrom to said chucks, a reversing mechanism, and means at said discharge position for automatically disconnecting the approaching chuck from said gear train, subjecting it to said mechanism, and thereafter reconnecting it with said gear chain.

7. In a buffing machine, the combination with a pair of buffing wheels, of an adjustable endless carrier provided with a series of rotatable threaded chucks adapted to engage and hold a series of similarly threaded articles to be treated, means for intermittently adjusting said carrier to subject each successive article first to one of said wheels and then to the other thereof, and means operative at predetermined times for rotating each chuck during the buffing of the article carried thereby in a direction which increases said threaded engagement, for stopping the rotation of the chuck and for rotating said chuck in the opposite direction thereafter to permit unthreading of said article.

8. In a buffing machine, the combination with a pair of buffing wheels, of an adjustable endless carrier provided with a series of rotatable threaded chucks adapted to engage and hold a series of similarly threaded articles to be treated, means for intermittently adjusting said carrier to advance each chuck toward one wheel, then to the other wheel, and then to a discharge position removed from said wheels, means for rotating said

chucks in a direction which increases the firmness of said inter-engagement except when they arrive at said discharge position, and predeterminedly and automatically operative means for causing a reversal of said rotation at said discharge position to permit withdrawal of the engaged articles at that position.

9. In a buffing machine, the combination with a pair of buffing wheels, of a rotatable chuck-head provided with a series of rotatable chucks for articles to be treated; means for intermittently rotating said head to subject each successive article first to one of said wheels and then to the other thereof, means for rotating said chucks, and means for reciprocating said head along its axis so as to feed the articles across the peripheries of the wheels between rotative movements thereof whereby successive portions of each article are presented successively to the various elements of each wheel.

10. In a buffing machine, the combination with a pair of buffing wheels, of a rotatable chuck-head provided with a series of rotatable chucks for articles to be treated; means for intermittently rotating said head to subject each successive article first to one of said wheels and then to the other thereof, means for intermittently reciprocating the head along its axis, and means for shifting the head laterally of the axis thereof during said reciprocation.

11. In a buffing machine, the combination with a pair of buffing wheels, of a rotatable chuck-head provided with a series of rotatable chucks for articles to be treated; means for intermittently rotating said head to subject each successive article first to one of said wheels and then to the other thereof, means for intermittently reciprocating the head along its axis, and a cam for shifting the head laterally of its axis in a predetermined manner during the reciprocation thereof.

12. In a buffing machine, the combination with a pair of buffing wheels, of a rotatable chuck-head provided with a series of rotatable chucks for articles to be treated; means for intermittently rotating said head to subject each successive article to contact first with the periphery of one of said wheels and then with the periphery of the other thereof, means for reciprocating said head along its axis, and means for shifting the head laterally of its axis during reciprocations.

13. In a buffing machine, the combination with a pair of buffing wheels, of a rotatable chuck-head provided with a series of rotatable chucks for articles to be treated; means for intermittently rotating said head to subject each successive article first to one of said wheels and then to the other thereof, means for reciprocating said head along its axis between rotative movements thereof, and means for shifting the head laterally of the axis thereof in a predetermined manner during reciprocations thereof.

14. In a buffing machine, the combination with a pair of buffing wheels, of an adjustable carrier for a series of articles to be treated, means for adjusting said carrier to subject each successive article first to one wheel and then to the other, said means simultaneously subjecting two successive articles to said wheels respectively, and means for further adjusting said carrier between the first named adjustments to axially reciprocate the articles being buffed so as to feed them across the periphery of the wheel during the process of buffing.

15. In a buffing machine, the combination with a pair of buffing wheels, of an adjustable carrier for a series of articles to be treated, means for adjusting said carrier to subject each successive article first to one wheel and then to the other, said means simultaneously subjecting two successive articles to said wheels respectively, and means for further adjusting said carrier between the first-named adjustments to axially reciprocate the articles being buffed and also shift said articles laterally of their axes.

16. In a buffing machine, the combination with a pair of buffing wheels, of an adjustable endless carrier provided with a series of chucks for a series of articles to be treated, means for adjusting said carrier intermittently to subject each successive article first to one of said wheels and then to the other, and means for further adjusting said carrier during the intervals between said first-named adjustments for axially reciprocating the articles being buffed so as to feed them across the periphery of the wheel thereby presenting successive portions of the article over each portion of the wheel.

17. In a buffing machine, the combination with a pair of buffing wheels, of an adjustable endless carrier provided with a series of chucks for a series of articles to be treated, means for adjusting said carrier intermittently to advance said chucks step by step along a substantially circular path tangent to said wheels, whereby each successive article will be advanced first toward one wheel and then toward the other, and means for reciprocating said chucks axially during the intervals between said first-named adjustments so as to advance the articles being buffed across the faces of said wheels.

18. In a buffing machine, the combination of a pair of staggered buffing wheels, of a rotatable chuck-head whose axis is inclined with respect to the wheel axes, said head being tangentially arranged with respect to said wheels and carrying a series of chucks for articles to be treated, and means for alternately rotating and axially reciprocating said head.

19. In a buffing machine, the combination of a pair of staggered buffing wheels, of a rotatable chuck-head whose axis is inclined with respect to the wheel axes, said head being tangentially arranged with respect to said wheels and carrying a series of circumferentially arranged, equally spaced chucks for articles to be treated, and means for intermittently rotating said head by an amount equal to the interval between adjacent chucks.

20. In a buffing machine, the combination of a pair of staggered buffing wheels, of a rotatable chuck-head whose axis is inclined with respect to the wheel axes, said head being tangentially arranged with respect to said wheels and carrying a series of circumferentially arranged, equally spaced chucks for articles to be treated, means for rotating said head in a step by step manner to advance successive chucks first toward one wheel and then toward the other, and means for axially reciprocating said head between rotative movements thereof.

21. In a buffing machine, the combination of a pair of staggered buffing wheels mounted to rotate in different planes and about different axes, of a chuck-head mounted for reciprocal movement along a direction which is substantially parallel to a plane tangent to both of said wheels.

22. In a buffing machine, the combination of a pair of staggered buffing wheels mounted to rotate in different planes and about different axes,

of a chuck-head mounted for reciprocal movement along a direction which is substantially parallel to a plane tangent to both of said wheels and which is substantially perpendicular to the line joining the points of tangency.

23. In a buffing machine, the combination of a pair of staggered buffing wheels mounted to rotate in spaced parallel planes about offset parallel axes, of a chuck-head mounted for reciprocal movement along a direction which is substantially parallel to a plane tangent to both of said wheels and substantially perpendicular to the line joining the points of tangency.

24. In a buffing machine, the combination of a pair of equi-sized buffing wheels mounted in parallel spaced planes to rotate about superposed parallel axes, of a rotatable and axially reciprocable chuck-carrier whose axis lies in the plane parallel to said wheel axes and is inclined with respect to the latter.

25. In a buffing machine, the combination of a pair of equi-sized buffing wheels mounted in parallel spaced planes to rotate about superposed parallel axes, of a rotatable and axially reciprocable chuck-carrier whose axis lies in the plane parallel to said wheel axes and is substantially perpendicular to the line joining the hubs of said wheels.

26. In a buffing machine, the combination of a pair of equi-sized buffing wheels mounted to rotate in parallel spaced planes about superposed parallel axes, of a rotatable and axially reciprocable chuck-head which is substantially tangent to both of said wheels and is provided with a series of circumferentially arranged chucks, the axis of said head being substantially parallel to the plane of said wheel axes and inclined with respect to the planes of said wheels.

27. In a buffing machine, an abrasive element, a member for holding an article to be treated when rotated in one direction and to release same when rotated in the opposite direction, means for periodically moving the member so as to bring the article into contact with the abrasive element hold it there for treatment and move it out of contact, means for moving said member so as to move the article across the surface of the abrasive element, means for moving said member laterally toward the abrasive element, and means to successively rotate said member while the article is in contact with the abrasive element, and at other times, and to stop the rotation and reverse the rotation of said member at predetermined times so as to release the article.

28. In a buffing machine, a rotative abrasive element, a member for holding an article to be treated, when rotated in one direction, and to release same when rotated in the opposite direction, means for periodically moving the member so as to bring the article into contact with the abrasive element, hold it there for treatment and move it out of contact, means for moving said member so as to move the article axially across the peripheral surface of the abrasive element, means for moving said member laterally toward said abrasive element, and means to successively rotate said member while the article is in contact with the abrasive element and at other times, and to stop the rotation and reverse the rotation of said member at predetermined times to release the article.

29. In a buffing machine, a pair of spaced abrasive elements, a pair of members for carrying articles to be treated, means for simultaneously moving each of said members so as to bring the article it carries into contact with a different one of said abrasive elements, means for simultaneously moving each of said members so as to move the article it carries across the surface of the abrasive element with which it is in contact, means for simultaneously moving each of said members laterally toward the abrasive element with which it is in contact, and means for moving one of said members out of contact and simultaneously moving the other member into contact with one of the abrasive elements.

30. In a buffing machine a pair of spaced abrasive elements, a pair of members for holding articles to be treated when rotated in one direction and to release same when rotated in the opposite direction, means for simultaneously moving each of said members so as to bring the article it carries into contact with a different one of said abrasive elements, means for simultaneously moving each of said members so as to move the article it carries across the surface of the abrasive element, with which it is in contact, means for simultaneously moving each of said members laterally toward said abrasive element with which it is in contact, means for moving one of said members out of the contact position and simultaneously moving the other member into contact position with one abrasive element, and means operative to rotate said members except at predetermined times, at which times rotation of said members is first stopped and then reversed to release the article it carries.

31. In a buffing machine, a pair of spaced rotating abrasive elements, a pair of members for carrying articles to be treated, means for simultaneously moving each of said members so as to bring the article it carries into contact with a different one of the abrasive elements, means for simultaneously moving each of said members so as to move the article it carries across the peripheral surface of said abrasive element with which it is in contact, means for simultaneously moving each of said members laterally toward its cooperating abrasive element, and means for moving one of said members out of operative relation and simultaneously moving the other member into operative relation with one of said abrasive elements.

32. In a buffing machine, a pair of spaced rotating abrasive elements, a pair of members for holding articles to be treated when rotated in one direction and to release them when rotated in the opposite direction, means for simultaneously moving each of said members so as to bring the article it carries into contact with one of the abrasive elements, means for simultaneously moving each of said members so as to move the article it carries across the peripheral surface of one of said abrasive elements, means for simultaneously moving each of said members laterally toward its cooperating abrasive element, means for moving one of said members out of operative relation and simultaneously moving the other member into operative relation with one of said abrasive elements, and means operative to rotate said members except at predetermined times, when rotation of said members is first stopped, and then reversed, to release the articles carried.

33. In a buffing machine, a pair of spaced abrasive elements a series of members for carrying articles to be treated, means for simultaneously shifting two adjacent members so as to bring the articles they carry into contact each one with a different abrasive element, means for

simultaneously moving each of said two adjacent members so as to move the article it carries across the surface of its respective abrasive element, means for simultaneously moving said two adjacent members laterally toward its respective abrasive member, means for moving one of said adjacent members out of operative relation with one of the elements and simultaneously moving the other member out of operative relation with the other of said elements and into operative relation with the first of said elements, and also simultaneously shifting a third member into operative contact with the other of said elements.

34. In a buffing machine, a pair of spaced, abrasive elements, a series of members for holding articles to be treated when rotating in one direction and adapted to release same when rotated in the opposite direction, means for simultaneously shifting two adjacent members into operative relation, each with a different abrasive element, means for simultaneously moving each of said two adjacent members so as to move the article it carries across the surface of said abrasive element, means for simultaneously moving said two adjacent members laterally toward said abrasive elements, means for moving one of said two members out of operative relation with one of the elements and simultaneously moving the other member out of operative relation with the other of said elements and into operative relation with the first of said elements and also shifting a third member into operative relation with the other element, means to rotate said members while they are in operative relation with the abrasive elements and at other times, and at predetermined times to stop rotation of said members and to reverse their rotation to release said articles to be treated.

35. A buffing machine having two moving abrading surfaces of different abrading characteristics moving in paths parallel to each other, a holder for successively presenting a plurality of articles to be treated to said surfaces, the same portions of each article being presented first to one surface and then to the other, and to be moved across said surfaces in a straight line while being treated, and said holder being positionally related to said surfaces so that two articles are simultaneously presented in a similar position, one to each of said surfaces.

36. A buffing machine having two moving abrading surfaces of different abrading characteristics moving in paths parallel to each other, a holder for successively presenting a plurality of articles to be treated to said surfaces, the same portions of each article being presented first to one surface and then to the other, and to be moved across said surfaces in a straight line and at an angle to the direction of motion thereof while being treated, and said holder being positionally related to said surfaces, so that two articles are simultaneously presented in a similar position, one to each of said surfaces.

37. A buffing machine having two moving abrading surfaces of different abrading characteristics moving in paths parallel to each other, a holder for successively presenting a plurality of articles to be treated to said surfaces, the same portions of each article being presented first to one surface and then to the other, and being moved across said surfaces while being treated, and said holder being positionally related to said surfaces so that two articles are simultaneously presented in a similar position, one to each of said surfaces.

38. A buffing machine having two moving abrading surfaces of different abrading characteristics moving in paths parallel to each other, a holder for successively presenting a plurality of articles to be treated to said surfaces, the same portions of each article being presented first to one surface and then to the other, and being moved across said surfaces at an angle to the direction of motion thereof while being treated, and said holder being positionally related to said surfaces, so that two articles are simultaneously presented in a similar position, one to each of said surfaces.

39. In a buffing machine, the combination with a buffing wheel of a rotatable chuck head, provided with a series of rotatable chucks for members to be treated, means for intermittently rotating said head to subject each successive member to the action of said wheel, means for intermittently reciprocating the head along its axis and cam means for shifting the head pivotally about an axis thereof during said reciprocation.

GODFREY DALKOWITZ.