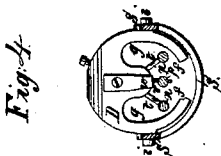
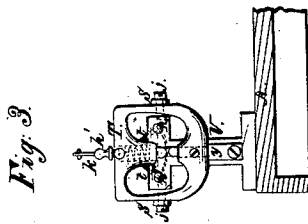
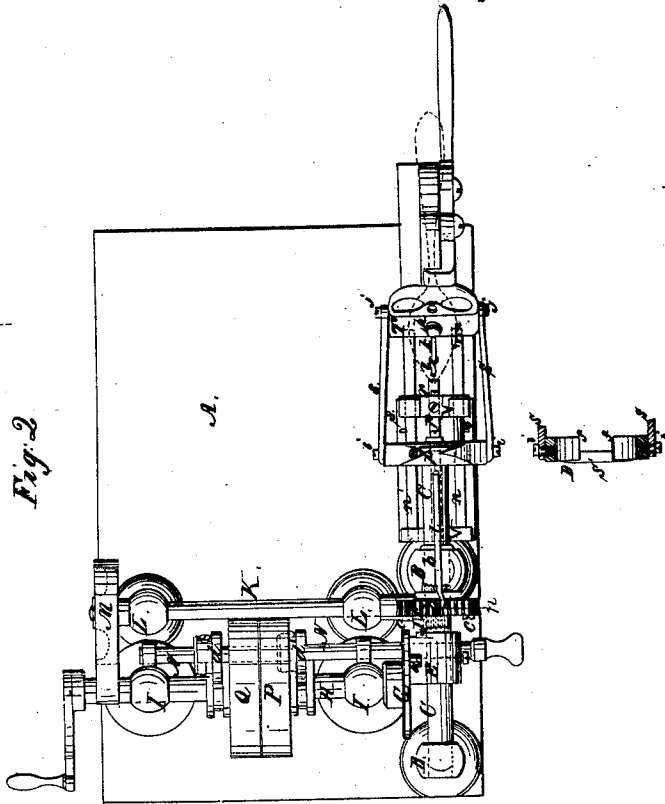
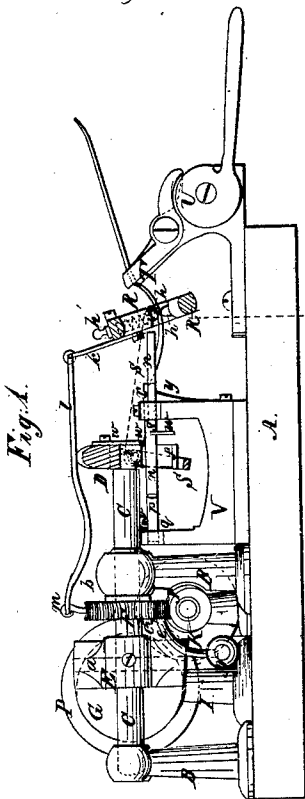


*L. S. White,*  
*Burnishing Machine.*

*N<sup>o</sup> 23,520.*

*Patented Apr. 5, 1859.*



*Witnesses:*

*Harlow D. Buel*  
*Lucius D. Buel*

*Inventor:*

*L. S. White*

# UNITED STATES PATENT OFFICE.

LE ROY S. WHITE, OF WATERBURY, CONNECTICUT.

## IMPROVED BURNISHING-MACHINE.

Specification forming part of Letters Patent No. 23,520, dated April 5, 1859.

*To all whom it may concern:*

Be it known that I, LE ROY S. WHITE, of Waterbury, in the county of New Haven and State of Connecticut, have invented a new and useful Improvement in Burnishing-Machines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side view of a machine with my improvements, exhibiting it partly in section. Fig. 2 is a plan of the same. Fig. 3 is a front view of the tool-stock. Fig. 4 is a transverse vertical section of the carriage to which the tool-stock is attached and of the contrivances for holding the articles to be burnished. Fig. 5 is a horizontal section of the principal portion of the tool-stock carriage.

Similar letters of reference indicate corresponding parts in the several figures.

My invention consists in so applying two burnishers in a burnishing-machine that the two shall operate simultaneously at opposite sides of the article or piece of work to be burnished, and that during such operation each shall serve to support the article or piece of work against the pressure of the other.

It also consists in a certain mode of applying and operating the stock which contains the so-called burnishers as to make it adapt the positions and movements of the burnishers to curved surfaces.

It further consists in a novel apparatus for holding the article or piece of work to be burnished on both sides in a stationary condition, and which permits the burnisher to burnish to the margin of such article or piece.

To enable others to make and use my invention, I will proceed to describe its construction and operation.

The machine represented is more particularly adapted for burnishing the bowls of spoons, and the reason why I have represented it is that it embraces all the features of my invention.

A is the bed-plate, on which all the other parts of the machine are supported. B B are standards, which contain the bearings for a horizontal reciprocating and partly rotating shaft, C, to the front end of which is firmly secured a yoke, D, which constitutes the principal portion of the tool-stock carriage, the

other parts of which will be presently described. The said shaft C is fitted with a slotted cross-head, E, and with a worm-gear, F, the cross-head being attached to the shaft, by a pin and circular groove or otherwise, in such manner that the shaft may turn in it, but be compelled to move longitudinally with it; and the worm-gear being fitted to the shaft, with a feather and straight groove or otherwise, in such manner that the shaft may slide through it, but be compelled to turn with it. The cross-head E is prevented turning by being made flat on one side to fit against a disk, G, which is secured to one side of a rotating horizontal shaft, H, which is supported at the same height as C in bearings in standards I I, and which constitutes the main shaft of the machine, said disk carrying a wrist, *a*, which enters a vertical straight slot in the cross-head, which by its revolution in the said slot serves to give the shaft C its reciprocating motion. The worm-gear F is prevented moving longitudinally with the shaft by being made with a sleeve to enter a bearing in the rear standard, B, and having a groove in said sleeve to receive the point of a screw or pin, *b*, entering through the bearing. The said worm-gear has imparted to it a partial rotary motion at a very slow speed, first in one and then in the reverse direction, by means of an endless screw, J, on a small shaft, K, which is arranged parallel with H in bearings L L, and which derives motion from H through a belt, M. The shaft C and yoke D are made to perform such portion of a complete revolution in opposite directions as may be desirable by means of two tappets, *c c*, on the worm-wheel, which are properly adjusted to operate alternately on the arm *e* of a horizontal sliding rod, N, which carries two forks, *d d'*, by which it is made to shift two pulleys, P Q, along the shaft H and couple each alternately with a clutch which is fast to the shaft. These pulleys are supposed to be driven continuously in opposite directions by suitable belts, and hence, as one or the other is coupled with the shaft and the other uncoupled, the direction of the revolution of the shaft H is reversed, and so is the direction of the movement of the shaft C and yoke D about their axes.

The precise form of the yoke D can be better understood by a comparison of Figs. 1, 2,

4, and 5 than by the aid of any written description, so I will merely state it to be of nearly circular form internally, with an opening, *f f g g*, to admit the holding apparatus, which holds the spoon or other article or piece of work to be burnished, to pass through it. The tool-stock R, which occupies a position some distance in front of the yoke D, consists of a strong frame, in which the two tools or burnishers, *h h'*, are arranged exactly opposite to or in line with each other, the burnisher *h* being fixed in the said frame, and the other, *h'*, having a spring applied to its stem in such a manner (shown dotted in Figs. 1 and 3) as to force it toward *h*, so that any article that is placed between them will be subjected to a sufficient degree of pressure between their faces by the action of said spring to effect the burnishing of both its sides or faces at once when a suitable movement is given either to the stock R or to such article. The said stock R has its sides connected with the sides of the yoke D by two rods, S S, said rods being formed in one piece and connected by a bow, S', passing under the yoke, the said rods being connected with the yoke and stock by pins *i i* and *j j*, which permit the tool-stock to swing freely up and down and back and forth in planes parallel with the axis of the shaft C. The stock has an arm, *k*, which stands up above its upper part, and which is connected by a rod, *l*, with an arm, *m*, which is secured in the worm-gear F or the shaft D.

The yoke D, the rods S S, and the rod *l* combined constitute what I call the "tool-stock carriage," as by this combination all the movements of the said stock are produced and controlled, the said stock having imparted to it a slow partial rotary movement in opposite directions alternately by the movement of the yoke about its axis, and deriving also an oscillating motion on the pins *j j* in consequence of its arm *k* being held by the rod *l*, while it is moved back and forth by the reciprocating rectilinear motion of the shaft C and yoke D. The arm *k* should be so proportioned that if the point of connection between the said arm and the rod *l* were stationary the points or faces of the burnishers would be caused by the oscillation of the stock to describe an arc approximating as nearly as possible to the average longitudinal curvature of the spoon-bowl to be operated upon; but the difference in the longitudinal curvature of the bowl in different parts will be compensated for by the oscillation permitted to the rods S S, which oscillation also allows the tool-stock to accommodate itself to the varying lateral curvature of the spoon-bowl, which could only be approximated to if the tool-stock were confined in its lateral movement by the positive circular movement of the shaft C and yoke D.

By the above operations of the tool-stock carriage the tools always occupy such a position that a line drawn centrally to the two will be normal to the curve of the bowl.

The holding apparatus by which the spoon

is held to be burnished by the combined movements of the burnishers along and across it consists of a clamp, T, secured to the bed-plate and having its upper and movable jaw operated by an eccentric, U, to make it grasp the neck of the spoon as close as practicable to the bowl, and three sliding bars, *n n' p*, for holding the bowl at the sides and end. These bars are fitted to slide parallel with the shaft C in guides in a stand, V, erected upon the bed-plate A. The central bar, *p*, has a cavity in its front end to receive the end of the bowl, and the side bars, *n n'*, which are arranged at about the same height, have grooves in their sides to receive the edges of the bowl. The central bar, *p*, is held up to its place to support the bowl by having the top part a short distance from its rear end cut away, as shown at 6 in Fig. 1, to form a shoulder or stop, which may be held upward in front of the rearmost guide of the stand V by a spring, *g*, which is attached to the bottom of the said bar *p*, and part of which enters the said guide along with the bar. The bars *n n'*, not being subjected to longitudinal pressure, have no stops, but are fitted tightly enough to their guides to prevent them sliding too easily.

The bars *n n' p* are represented as made of round iron or steel, but have flats filed or otherwise made in their front portions for a plate, *r*, that is bolted to the front of the stand V, to rest upon for the purpose of preventing the said bars turning. These bars *n n' p* pass through the yoke D, and the bars *n n'* pass through the tool-stock also; and in order to provide for the moving of the said bars one at a time out of the way of the burnishers as the latter approach either side or the central portion of the bowl, and moving them back again to support the bowl as soon as the burnishers have moved out of their way again, the said bars *n n'* are provided each with two studs or projections, *st*, and the bar *p* is provided with two studs or projections, *uv*, to be operated upon by the yoke D, which is properly formed for the purpose, to push the bars out of and into their places again, as required, always leaving the bowl supported by two of the three bars. The burnishers, though having a rapid reciprocating movement longitudinally to the bowl, move very slowly across it, and before they approach either side of the bowl nearly enough to touch the bar *n* or *n'* the piece *w*, attached to the central portion of the yoke, strikes the stud *t* of that bar and drives it back, where it remains till after the movement of the shaft C and yoke D on their axis has been reversed by the operation of one of the tappets *c* on the sliding bar N and the burnishers have moved far enough away from the sides of the bowl to permit the bar to be replaced, when the front edge of one side of the lower part, *f f*, of the opening in the yoke strikes the pin *s* and drives it forward again. Before the burnishers arrive near enough to the center of the spoon to strike the bar *p* the piece *w* strikes the inclined upper surface of the short stud *v*

on the said bar and depresses the said bar so far that the shoulder is brought below the top of the guide and the said bar is allowed to be forced back by a spring, *y*, attached to the front of the stand *V* for the purpose, and remains back clear of the tip of the bowl till the burnishers have moved far enough across the spoon to permit it to come forward again, when the stud *u* is struck by one of the front edges of the part *f f* of the opening, and the said bar moved forward again far enough for the shoulder or stop *6* to arrive in front of the guide and be forced up again by the spring *g*, to stop the retreat of the said bar till the proper time again arrives for it to move back out of the way of the burnishers.

For burnishing many articles or many kinds of work—as, for instance, the handles of many spoons—the shaft *C* will require no movement about its axis, as the only movement required for the tool-stock will be the reciprocating backward and forward movement, with a proper oscillating movement to adapt the burnisher to the longitudinal curvature.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. So applying two burnishers in a burnishing-machine that they shall operate simultaneously at opposite points on opposite sides of the article or piece of work to be burnished and burnish both sides at once, and that during such operation each shall serve to support the article or piece of work against the pressure of the other, substantially as herein set forth.

2. The combination of the reciprocating and partially-rotating shaft *C* and yoke *D*, or their equivalent, and the tool-stock *R* by means of the rods *S S*, the arm *R*, rod *l*, and arm *m*, the whole operating substantially as and for the purposes herein specified.

3. The sliding bars *n n' p*, applied in combination with the tool-stock carriage to operate substantially as and for the purposes herein specified.

LE ROY S. WHITE.

Witnesses:

NORTON J. BUEL,  
LUCIUS B. BRYAN.