May 13, 1924. 1,493,787

E. M. LITTLE ET AL

BUMPER POLISHING MACHINE

Filed Feb. 3. 1921 3 Sheets-Sheet 1

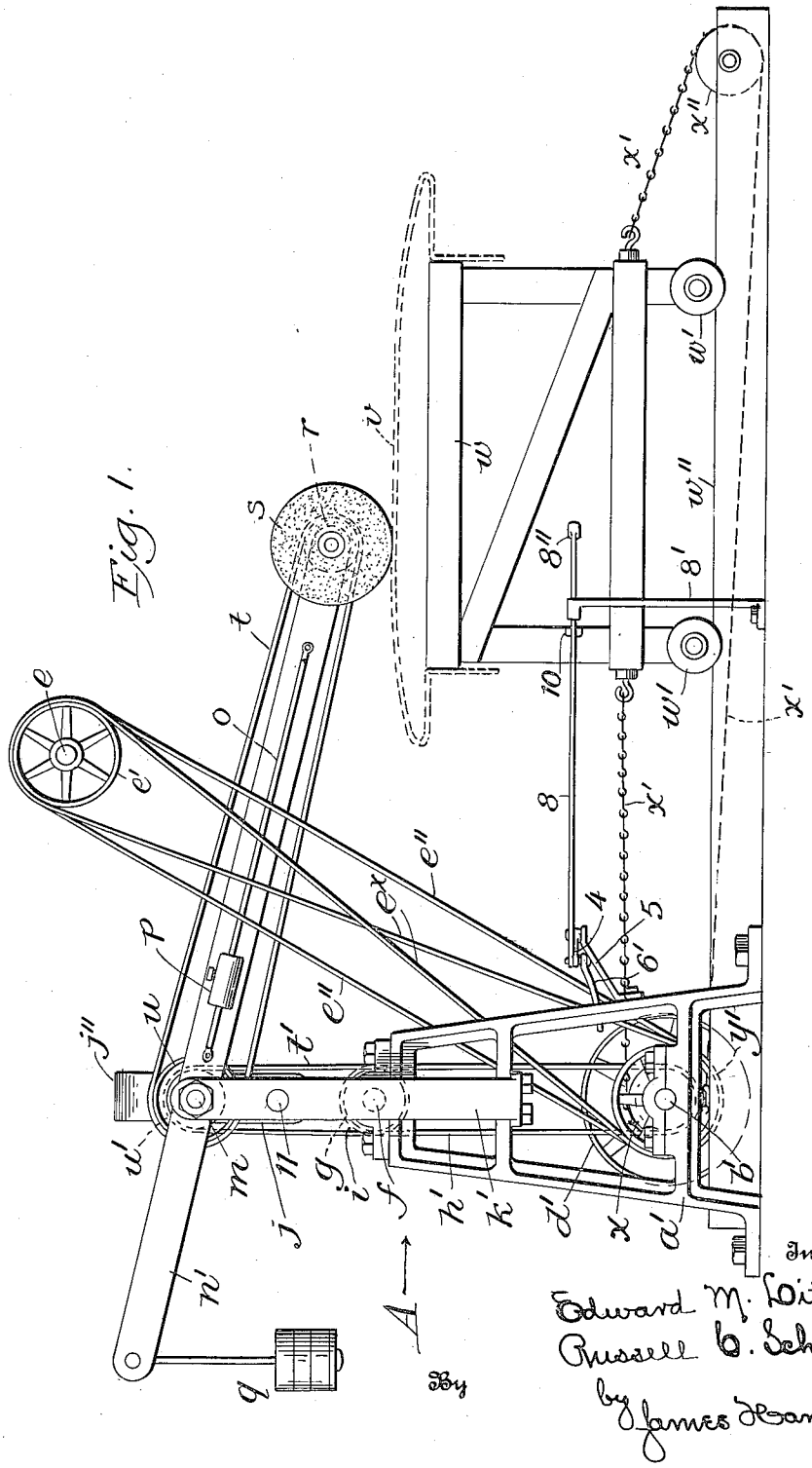


Fig. 1.

Inventor
Edward M. Little
Russell B. Schaefer
by James Hamilton
Attorney

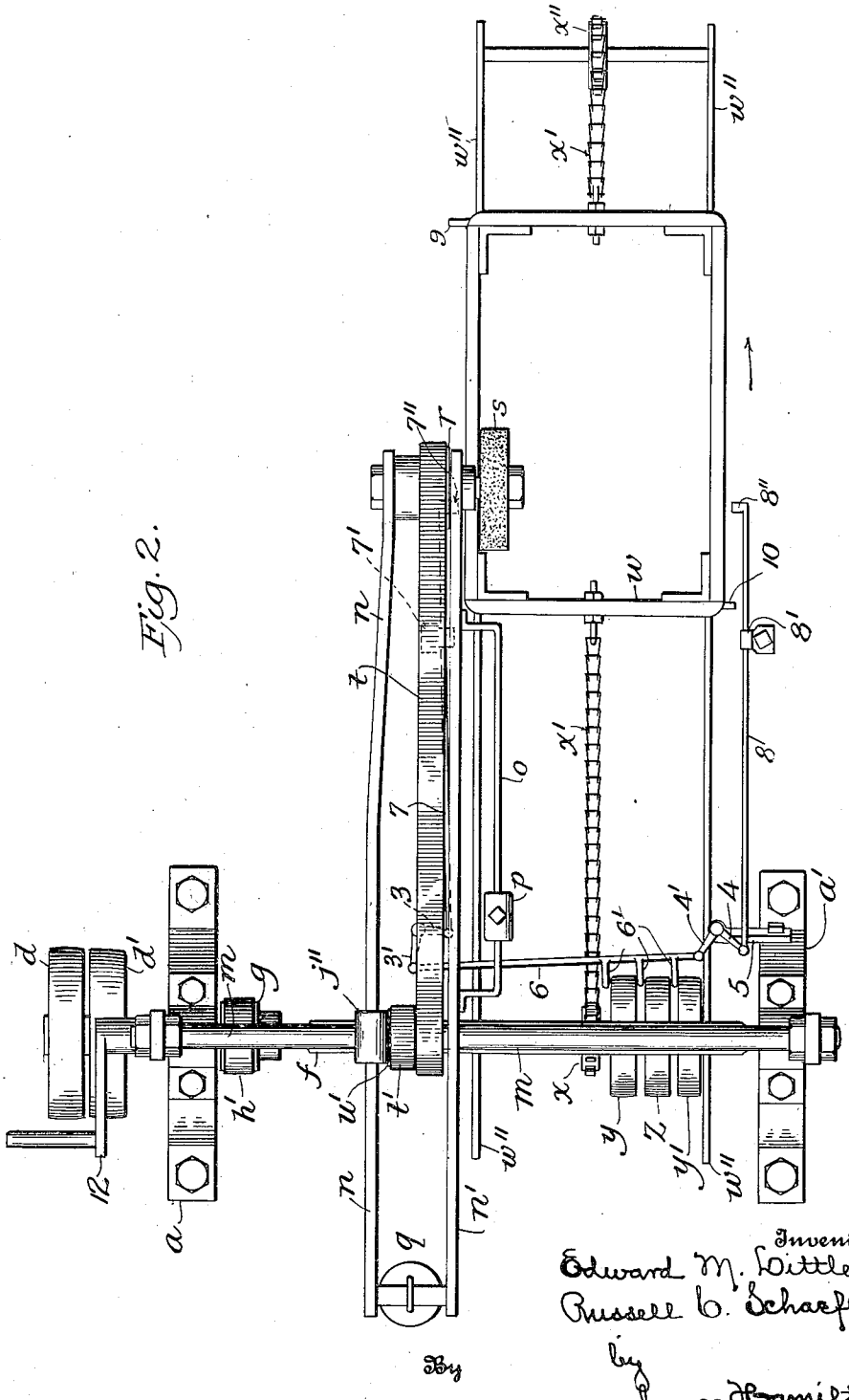
May 13, 1924. 1,493,787

E. M. LITTLE ET AL

BUMPER POLISHING MACHINE

Filed Feb. 3, 1921 3 Sheets-Sheet 2

Fig. 2.



Inventors
Edward M. Little
Russell B. Schaefer
By James Hamilton
Attorney

May 13, 1924. 1,493,787

E. M. LITTLE ET AL

BUMPER POLISHING MACHINE

Filed Feb. 3, 1921 3 Sheets-Sheet 3

Fig. 3.

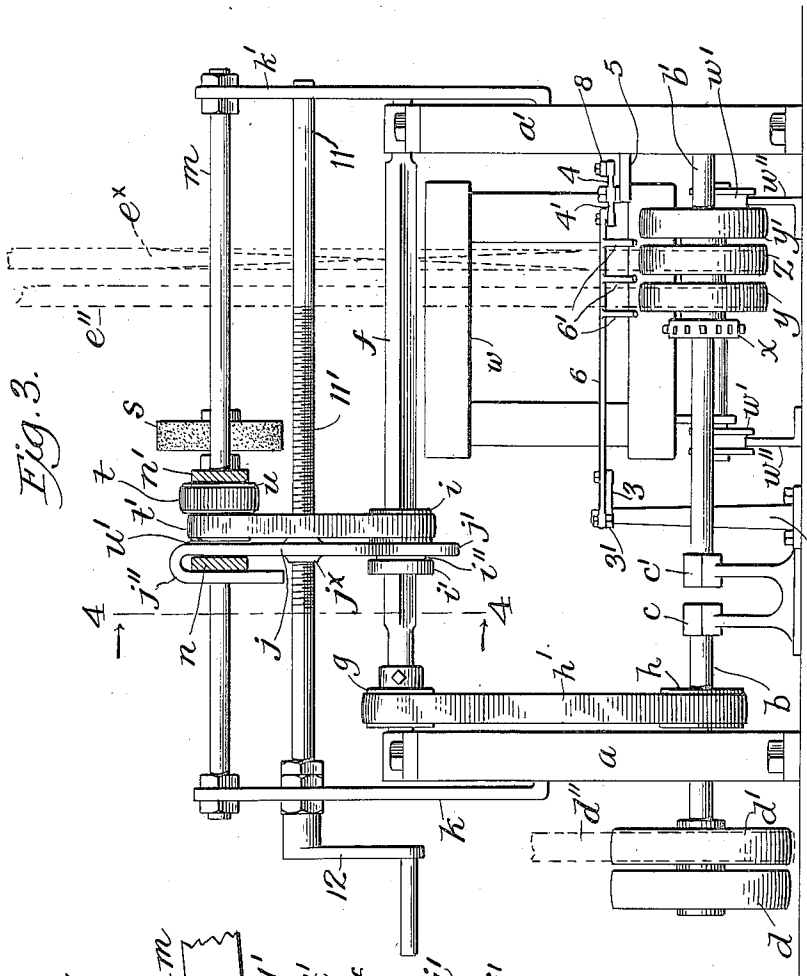
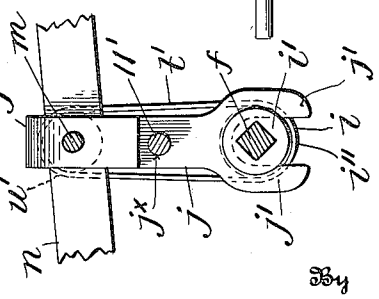


Fig. 4.



Inventors
Edward M. Little
Russell B. Schaefer
By James Hamilton
Attorney

Patented May 13, 1924. 1,493,787

UNITED STATES PATENT OFFICE.

EDWARD M. LITTLE AND RUSSELL C. SCHAEFER, OF SAN FRANCISCO, CALIFORNIA, ASSIGNORS TO HOOVER SPRING COMPANY, OF SAN FRANCISCO, CALIFORNIA, A CORPORATION OF CALIFORNIA.

BUMPER-POLISHING MACHINE.

Application filed February 3, 1921. Serial No. 442,062.

To all whom it may concern:

Be it known that we, EDWARD M. LITTLE and RUSSELL C. SCHAEFER, citizens of the United States of America, and residents of the city and county of San Francisco, in the State of California, have invented certain new and useful Improvements in Bumper-Polishing Machines, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to improvements in polishing machines and particularly to machines for polishing fenders or bumpers used upon automobiles, especially bumpers such as the Hoover bumper shown and described in United States Patent No. 1,191,306, granted Thomas A. Hoover, July 18, 1916. An object of this invention is to provide a bumper-polishing machine which will be simple in construction, comparatively cheap in manufacture and low in cost of installation and repair, and efficient and durable in operation and use.

In the drawings illustrating the principle of this invention and the best mode now known to me of applying that principle, Fig. 1 is a side elevation of the polishing machine; Fig. 2 is a plan thereof; Fig. 3 is an end elevation looking in the direction of the arrow A in Fig. 1, parts being shown in section; and Fig. 4 is a sectional detail taken on the line 4—4 of Fig. 3 and illustrates the shifter for the polisher-carrying frame or beam.

A pair of machine-standards *a*, *a'* (Figs. 1 and 3), one at each side of the machine, support a pair of driven shafts *b*, *b'*, the opposed inner ends of these shafts being journalled in the pillow-blocks *c*, *c'*, respectively, while their outer ends are journalled in the standards *a*, *a'*, respectively. On the outer end of the driven shaft *b*, there are mounted a loose or idle pulley *d*, and a fast or driving pulley *d'* to which power is transmitted from a power-shaft *e* (Fig. 1) by means of a belt *d''*, which may be shifted from one of the pulleys *d*, *d'*, to the other thereof, by means of a belt-shifter (not shown). As will be seen from an inspection of Fig. 3, the shafts *b*, *b'*, are mounted in the lower parts or bases of the standards *a*, *a'*, respectively. In the upper ends of the latter, there are journalled the ends of a transverse or horizontal shaft *f*, upon which is mounted fast a pulley *g* that is belt-connected with a pulley *h* fixed upon the driven shaft *b*. The greater part of the length of the transverse shaft *f* is faced, that is, is polygonal in cross-section; and, mounted free to slide along the faced portion of the shaft *f*, there is a pulley *i* integral with which is a hub or collar *i'* formed with a groove *i''* with the walls of which engage the branches or fingers *j'* of the lower bifurcated end of a shifter or pusher *j*.

From the standards *a*, *a'*, there rise the vertical arms or posts *k*, *k'*, respectively, in the upper ends of which there are fastened the ends of a horizontally-disposed fixed rod or fulcrum-shaft *m* upon which there are mounted, free to rock, the side-arms *n*, *n'*, of a double-armed polisher-carrying frame. The upper end *j''* of the shifter *j* is bent back upon itself to form an inverted U, between the legs of which lies the arm *n* of the polisher-carrying frame or beam. The other arm *n'* thereof carries a bracket *o* upon which there is mounted, free to be adjusted in position, a weight *p*. From one end of the polisher-carrying beam there hangs a counterweight *q* and, in the other end thereof, there is rotatably mounted a pulley *r* that drives a polishing wheel *s* and that is connected, by means of a belt *t*, with the pulley *u* that forms one of a set of double or cone pulleys *u*, *u'*, both mounted free to rotate on the fixed shaft *m*. By means of the belt *t'*, the other pulley *u'*, which is integral with the pulley *u*, is connected with the transversely slidable pulley *i*, having the grooved extension or hub *i'*, hereinbefore described. When the shaft *b* turns, its rotatory motion is communicated to the cone-pulleys *u*, *u'*, through the pulley *h*, belt *h'*, pulley *g*, shaft *f*, pulley *i* and belt *t'*; and, in turn, the rotatory motion is transmitted through the belt *t* to the pulley *r* and the polishing-wheel *s*. When the shifter *j* is caused to reciprocate by turning the threaded shaft 11 upon which it is mounted, as more particularly described hereinafter, the polisher-carrying frame or beam *n*, *n'*, and the pulleys *u*, *u'*, *i*, are caused to slide along their respective shafts *m*, *f*. During this displacement or shift-

ing, the pulleys u, u', remain belt-connected with the pulleys r, i, respectively, so that the polishing-wheel s continues in operation during the sliding movement.

The bumpers v are carried by a truck or carriage w having wheels w' that travel along tracks or rails w''. To move this carriage w back and forth lengthwise of the machine and over the rails w'', the following-described mechanism is provided: Upon the shaft b', there is mounted fast a sprocket-wheel x over which runs a sprocket-chain x' which is guided by the guide-sprocket x'' and the ends of which are fastened to the work-carrying truck or table w (Figs. 1 and 2). Upon the shaft b'' (Fig. 3), there are mounted loose the idler-pulleys y, y', and, between the latter, a fixed pulley z. On the power-shaft e, there is mounted a pulley e', over which run a straight belt e'' and a crossed belt e^x. When the crossed belt e^x drives the shaft b' through the fixed pulley z, the straight belt e'' runs over the idler-pulley y; and, when the straight belt e'' drives the pulley z and the shaft b' in the opposite direction, the crossed belt e^x is shifted to the other idler-pulley y'. Through the following arrangement of parts, the belts e'', e^x, are shifted automatically by the carriage w as it approaches the end of its travel, first in one direction and then in the opposite direction, namely: Upon the upper end of the post 2 (Fig. 3), there is mounted, free to swing a bell-crank lever 3, 3'; and there is similarly mounted a bell-crank lever 4, 4', upon a bracket 5, which is supported by the machine-standard a' and projects inwardly therefrom. Pivotally secured to the arms 3', 4', of these bell-cranks are the ends of a transversely-disposed link or shifter-rod 6 (Fig. 2), from which extend the shifter-fingers 6', between which travel the belts e'', e^x (Figs. 3 and 1). In the upper ends of the posts 7', 8', there are slidably mounted the rods 7, 8, respectively, which are horizontally disposed and extend substantially parallel to each other and longitudinally of the machine (Fig. 2). One end of the push-rod 7 is pivotally secured to the bell-crank arm 3, while one end of the pull-rod 8 is pivotally secured to the bell-crank arm 4. The free ends 7'', 8'', of these rods 7, 8, respectively, are bent inwardly towards each other and form lugs which extend into the paths of travel of the dogs 9, 10, respectively, that project in opposite directions from diagonally-opposite corners of the bumper-carrying vehicle w. As illustrated in the drawings, particular reference now being made to Fig. 2, the carriage w is moving to the right or to the front end of the machine and the dog 10 is about to engage the free end 8'' of the pull-rod 8. When these parts 10, 8'', do enter into engagement, the pull-rod 8 will be drawn along with the bumper-carrying truck w, as the latter continues its travel towards the right in Fig. 2. The lengthwise movement of the pull-rod 8 results in rocking the bell-crank 4, 4', upon its pivot or fulcrum, whereby the shifter-rod 6 is moved lengthwise towards the standard a' and the shifter-fingers 6' force the belts e'', e^x, to the right in Fig. 3. In this way, the crossed-belt e^x is shifted from the driving pulley z to the idler-pulley y' and the straight belt e'' is transferred from the idler-pulley y to the fast pulley z, thereby causing the direction of rotation of the latter and of the shaft b' to be reversed, whereupon the work-carrying vehicle w will travel in the opposite direction, viz, to the left in Fig. 2 or towards the rear of the machine. When the shifter-rod 6 is thrown towards the standard a' as just described, the bell-crank 3, 3', is rocked on its pivot and the push-rod 7 is moved lengthwise towards the right in Fig. 2 or towards the front of the machine. The direction of travel of the carriage w having been reversed, as just stated, the carriage moves along the rails w'' towards the rear of the machine; and, as the carriage nears the end of its travel in this direction, the dog 9 thereon engages the bent end 7'' of the push-rod 7 and forces the same lengthwise towards the rear of the machine, whereby the bell-crank 3, 3', is rocked on its pivot and the shifter-rod 6 is moved lengthwise towards the left in Fig. 3, causing the belts e'', e^x, to take the position illustrated by dotted lines in the latter figure and the reversal of the direction of rotation of the fast or driving pulley z and the shaft b' and of the direction of travel of the carriage w. By the carriage-reversing mechanism hereinbefore described, the bumpers v are carried back and forth below the polishing-wheel s automatically.

In order to move the polisher-carrying beam or frame n, n', transversely of the machine, there is provided a shaft 11 which is mounted rotatably in the posts k, k,' and upon one end of which there is fastened a crank 12. The shaft 11 is threaded for a portion 11' of its length; and this threaded portion passes through a hole j^x which is formed in the shifter j and the wall of which is threaded and engages the screw-shaft 11, so that, when the latter is turned, the bifurcated shifter j is thereby made to travel along the shaft 11 (Fig. 3). Since the side-bar n of the polisher-carrying frame is interlocked with the upper end j'' of the shifter j, the frame will thereby be caused to travel along the fixed fulcrum-shaft m and will carry along with it the polishing-wheel s. The forked end j' of the shifter j being in engagement with the grooved extension or hub i' of the pulley i,

the movement of the shifter *j* will be communicated to the pulley *i* and the pulleys *i*, *u'*, are maintained, during their travel crosswise of the machine, in the same vertical plane, so that the polishing-wheel *s* is kept in rotation during this transverse movement. By turning the screw-chaft 11 by means of the manually-operated crank 12, the operator is enabled to polish all the bumpers *v* arranged upon the carriage *w*, as the same moves back and forth length wise of the machine upon the track *w''*, as has been hereinbefore described.

The operation of the polishing machine may now be briefly described and will be readily understood, in view of the description of the arrangement of parts set forth hereinbefore. The shaft *b'* is driven by the power transmitted through one of the belts *e''*, *e*ˣ, from the power-shaft *e* (Fig. 1) to the driving pulley *z* and the bumper-laden carriage *w* is moved along the rails *w''* by the pull of the sprocket-chain *x'*, bringing the bumpers *v* under the polishing-wheel *s*, which is rotated from the shaft *b* through the pulley *h*, belt *h'*, pulley *g*, shaft *f*, pulley *i*, belt *t'*, pulleys *u'*, *u*, belt *t* and pulley *r* (Figs. 3 and 1). By turning the shaft 11, by means of the crank 12, the shifter *j* is caused to travel along the transverse shafts *f*, 11, *m*, and moves along with itself the frame *n*, *n'*, fulcrumed on the shaft *m* and carryng the polisher *s*, and the pulleys *r*, *u*, *u'*, and the belt *t* driving the polisher *s*. By the engagement of dogs 9, 10, that project from diagonally-opposite corners of the truck *w*, with the ends 7'', 8'', of the rods 7, 8, respectively, the belts *e''*, *e*ˣ, are shifted alternately upon and from the driving pulley *z*, thereby reversing the direction of rotation of the latter and the direction of travel of the carriage *w* automatically, as has hereinbefore been explained.

We claim:

1. A machine of the character described, including a stationary or fixed fulcrum-shaft; a polisher; a polisher-carrying beam mounted on the fulcrum-shaft, free to slide therealong and to swing freely thereon and thereby to maintain the polisher in contact with the work and free to follow the inequalities of the surface of the work automatically; polisher-actuating means mounted on the fulcrum-shaft and controlled as to position thereon by the beam; a rotary driving-shaft; driving mechanism which is driven by the driving-shaft and which drives the polisher-actuating means; a shifter which engages the beam and the driving mechanism and shifts the same back and forth along the fulcrum-shaft and the driving-shaft, respectively, and thereby causes the polisher, while rotating, to move over the work; and means for reciprocating the shifter.

2. A machine of the character described, including a shaft; a pulley fast thereon; belts for driving the pulley; means for shifting the belts in turn upon and from the pulley to reverse the direction of rotation of the shaft; a vehicle upon which the work to be polished is carried; reciprocating means for connecting the vehicle with the shaft to move the vehicle back and forth; and devices carried by the vehicle for actuating the means for shifting the belts and reversing the direction of rotation of the shaft and of travel of the vehicle and the work carried thereby.

3. A machine of the character described, including a shaft; a sprocket-wheel fast thereon; a vehicle upon which the work to be polished is carried; a sprocket-chain which runs over the sprocket-wheel and is connected with the vehicle and by which the latter is pulled back and forth; a pulley fast upon the shaft; belts for driving the pulley alternately in opposite directions; a belt-shifter for throwing the belts upon and from the pulley to reverse the direction of rotation of the shaft; and means controlled by the vehicle for automatically actuating the belt-shifter and reversing the direction of rotation of the shaft and of travel of the vehicle and the work carried thereby.

4. A machine of the character described, including a stationary or fixed fulcrum-shaft; a polisher; a polisher-carrying beam mounted on the fulcrum-shaft free to slide therealong and to swing freely thereon and thereby to maintain the polisher in contact with the work and free to follow automatically the inequalities of the surface of the work; polisher-actuating means mounted on the fulcrum-shaft and controlled as to position thereon by the beam; a rotary driving-shaft; a pulley which is driven by the latter and is slidable therealong and which is belt-connected with the polisher-actuating means; a shifter which engages the beam and the pulley and shifts the same back and forth along the fulcrum-shaft and the driving-shaft, respectively, and thereby causes the polisher during its operation to move over the work; and a threaded shaft upon which the shifter is mounted and by the rotation of which the shifter is moved back and forth.

5. In a machine of the class described, a reciprocable vehicle adapted to support articles to be polished, automatically operating means for reciprocating said vehicle, a pivotally mounted beam, a polisher carried by said beam, means for driving said polisher, counter-weight means associated with the beam and functioning to permit the beam to freely move so that the polisher may follow the surface of the work supported by the vehicle as the vehicle reciprocates, and means for moving said beam and polisher trans-

versely to the line of movement of the vehicle to permit the polisher to travel across the work.

6. In a machine of the class described, a shaft, a sprocket wheel fixedly mounted on said shaft, a reciprocating vehicle adapted to support the work to be operated upon, a sprocket chain passing over said sprocket wheel and having its ends connected to said vehicle, a pulley fixedly mounted on said shaft, loose pulleys also mounted on the shaft, an uncrossed and a crossed belt engageable with said pulleys for driving the shaft in opposite directions, belt shifters for alternately moving each of the belts from the fixed pulley to one of the loose pulleys, and means controlled by said vehicle for actuating said belt shifter.

7. In a machine as claimed in claim 6, the last mentioned means including bell-crank levers, slidable rods connected to said bell-crank levers, and abutments on the carriage and rods for shifting the latter.

8. In a machine of the class described, a driven shaft, a pulley rotatable with the shaft slidably mounted on the latter, a stationary shaft, a pulley loosely mounted on the stationary shaft, a shifting member adapted to move said pulleys along said shafts, a threaded rod for actuating said shifting member, a beam pivotally mounted on the stationary shaft and carrying a polisher, and means for actuating said polisher from the pulley on the stationary shaft.

9. A machine of the character described, including a shaft; a polisher-carrying beam mounted to swing freely thereon and to slide back and forth therealong; a polisher carried by the beam; polisher-driving mechanism including a second shaft, a pulley slidable back and forth along the second shaft, and a second pulley slidable back and forth along the first-named shaft and controlled as to position thereon by the beam and belt-connected to the other pulley and the polisher; a shifter which is in engagement with the beam and the first-named pulley and which shifts the beam and the belt-connected pulleys along their respective shafts; and a threaded shaft by the rotation of which the shifter is reciprocated and causes the polisher during its operation to travel over the work.

10. In a machine of the character described, the combination with a work-carrying vehicle, of means for reciprocating the same, said means including a shaft; a wheel thereon; a chain which passes over the wheel and is fastened to the vehicle for pulling the latter back and forth; and belt-and-pulley mechanism by which the shaft is driven first in one direction and then in the opposite direction, said mechanism comprising idle and fixed pulleys mounted on the shaft, belts by which the fixed pulleys are driven alternately and in opposite directions, belt-shifting mechanism by which the belts are shifted in turn from the idle pulley to one of the fixed pulleys, and means carried by the vehicle for controlling the operation of the belt-shifting mechanism.

11. A machine of the character described, including a shaft; a polisher-carrying beam mounted to swing freely thereon and to slide back and forth therealong; a polisher carried by the beam; polisher-driving mechanism including a second shaft, a pulley slidable back and forth along the second shaft, and a second pulley slidable back and forth along the first-named shaft and controlled as to position thereon by the beam and belt-connected to the other pulley and the polisher; a shifter which is in engagement with the beam and the first-named pulley and which shifts the beam and the belt-connected pulleys along their respective shafts; a threaded shaft by the rotation of which the shifter is reciprocated and causes the polisher during its operation to travel over the work; a work-carrying vehicle; means for reciprocating the vehicle, said means including a shaft; a wheel thereon; a chain which passes over the wheel and is fastened to the vehicle for pulling the latter back and forth; and belt-and-pulley mechanism by which the last-named shaft is driven first in one direction and then in the opposite direction, said belt-and-pulley mechanism comprising idle and fixed pulleys mounted on the last-named shaft, belts by which the fixed pulleys are driven alternately and in opposite directions, belt-shifting mechanism by which the belts are shifted in turn from the idle pulley to one of the fixed pulleys, and means carried by the vehicle for controlling the operation of the belt-shifting mechanism.

Signed at the city and county of San Francisco, in the State of California, this twenty-eighth day of January, 1921, in the presence of the two undersigned witnesses.

EDWARD M. LITTLE.
RUSSELL C. SCHAEFER.

Witnesses:
E. DOWNING,
B. WILSON.