No. 822,461. PATENTED JUNE 5, 1906.

J. W. MADDOX.

RUBBING AND POLISHING MACHINE.

APPLICATION FILED FEB. 16, 1904.

2 SHEETS—SHEET 1.

Fig. 1.

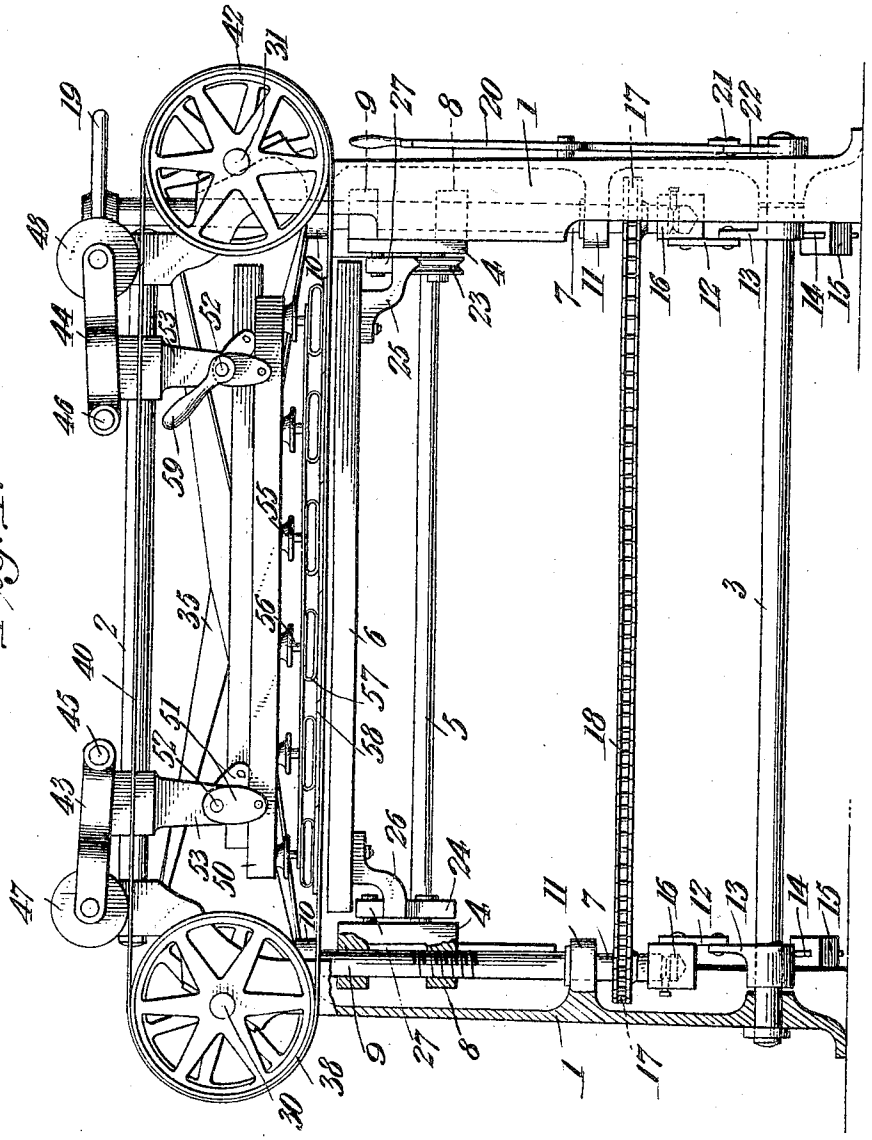

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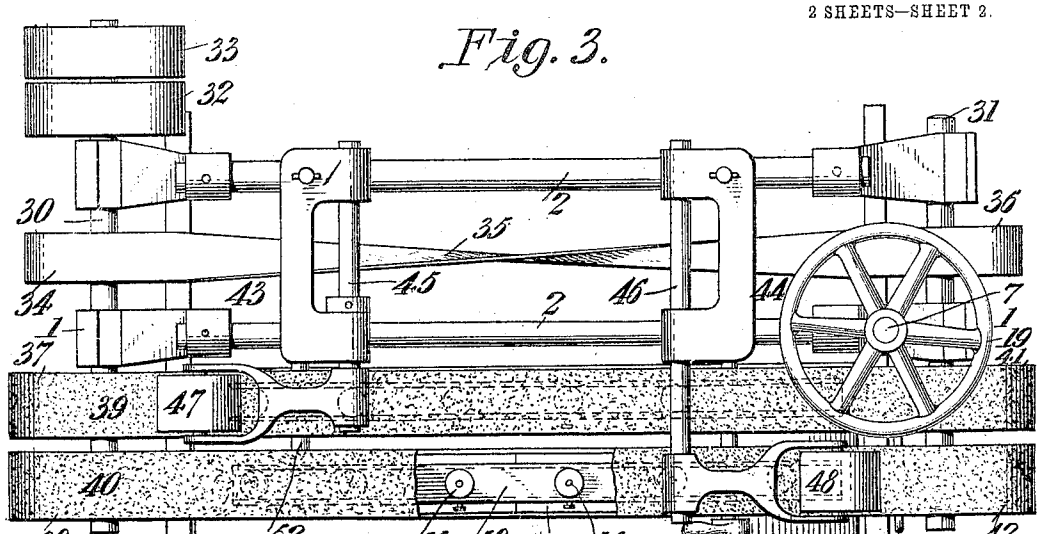
Fig. 3.



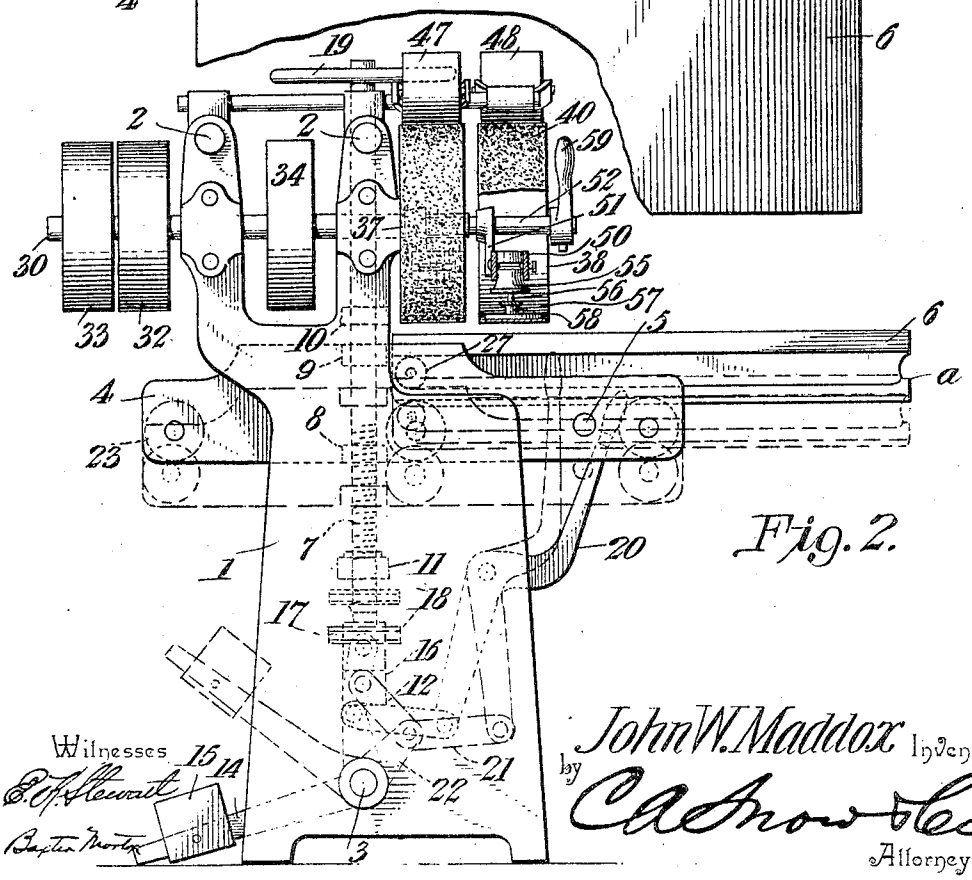


Fig. 2.

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UNITED STATES PATENT OFFICE.

JOHN W. MADDOX, OF JAMESTOWN, NEW YORK.

RUBBING AND POLISHING MACHINE.

No. 822,461. Specification of Letters Patent. Patented June 5, 1906.

Application filed February 16, 1904. Serial No. 193,849.

To all whom it may concern:

Be it known that I, JOHN W. MADDOX, a citizen of the United States, residing at Jamestown, in the county of Chautauqua and State of New York, have invented a new and useful Rubbing and Polishing Machine, of which the following is a specification.

This invention relates to rubbing and polishing machines, and more especially to that type of rubbing and polishing machines in which the rubbing and polishing elements consist of one or more belts provided upon the operative surfaces thereof with suitable polishing or abrading materials, such as sandpaper.

The principal object of the present invention is to improve the construction of machines of the character specified by simplifying the general design of such machines, provide novel means for quickly bringing the work into and removing it from position to be operated upon by the rubbing and polishing elements, to provide a novel arrangement of belts whereby the preliminary smoothing and final smoothing may both be effected in a single machine with a minimum loss of time in throwing one set of mechanisms out of operative position and bringing the other into operative position, and to lessen the cost, decrease the power and cost of operation, and to improve various minor details in the construction of machines of this character, as will appear when the invention is more fully disclosed. It is furthermore designed to adapt the machine for sandpapering fine woodwork—such as pianos, furniture, and the like—that requires a very fine surface for the finishing operation.

In attaining the objects above mentioned I preferably employ a machine of the character hereinafter fully described and claimed, and illustrated in a preferred form of embodiment in the accompanying drawings, it being understood that changes in the form, proportions, and exact mode of assemblage of the elements exhibited may be made without departing from the spirit of the invention or sacrificing the advantages thereof.

In the drawings, Figure 1 is a view in front elevation of the complete machine. Fig. 2 is a view in end elevation, the parts being broken away to illustrate one of the vertically-adjustable shafts for the support of the work-table. Fig. 3 is a plan view.

Referring to the drawings, in which corresponding parts are designated by similar characters of reference in the several views, 1 1 represent standards at the ends of the machine, which may be of any suitable character, but which are preferably formed of cast iron or steel and are connected by means of longitudinally-disposed rods 2 2 at the top of the machine and a similar rod 3 near the bottom of the machine, the standards 1 1 and the longitudinally-disposed rods 2 2 and 3 thus forming a rigid frame structure upon which the other parts of the machine are supported.

The bed or work-table of the machine comprises a frame consisting of side bars 4, disposed transversely of the machine, and longitudinally-disposed connecting-rods 5 and a reciprocatory carriage 6, carried by the frame and supported upon bearing-rollers. The frame is adjustably supported between the standards 1 1 of the machine by means of threaded shafts 7, which extend through lateral lugs 8 and 9, carried by the side bars 4 and bored for the passage of the shafts 7. The lower lugs 8 are threaded for engagement with the threaded portions of the shaft, and the upper lugs are smooth-bored to permit free movement of the shafts therein. The shafts 7 are guided in their movement by lugs 10 and 11, provided upon the inner surfaces of the machine-standards 1 1, the lugs 10 being disposed above the work-table and the lugs 11 being disposed below, as shown. All the lugs 10 and 11 are provided with smoothly-bored openings, through which the shafts 7 have a free-sliding movement, and the shafts are supported at their lower ends by means of two pairs of toggle-links, each pair of links comprising an upper link 12 and a lower link 13, having a lever-arm 14 projecting therefrom at right angles and bearing an adjustable counterweight 15. The lower links 13 are securely fastened upon the rod 3, extending longitudinally of the machine, so that when rocking movement is imparted to the rod the toggle-links at both ends thereof will be correspondingly moved. Each of the links 12 has pivotally connected therewith at its upper end a socket 16, in which one of the shafts 7 is arranged to rotate. The shaft is preferably secured therein by means of pointed screws engaging circumferential grooves near the end of the shaft. Just above the sockets 16 the shafts 7 are both provided with sprocket-wheels 17, which are rigidly attached to the shafts and are connected by means of a chain or link belt 18, running

around the two sprockets. At its upper end one of the shafts 7 is provided with some suitable means for imparting rotative movement thereto, a hand-wheel 19 being the means preferably employed for that purpose.

When rotative movement is imparted to the hand-wheel 19, the shafts 7 will both be turned and the frame carrying the work-table will be raised or lowered, according to the direction of movement, as the threaded engagement of the lugs 8 with the threaded portions of the shafts 7 necessarily causes said lugs to move up or down upon the shaft 7 when rotated. When it is desired to quickly raise or lower the work-table, such movement may be effected by means of a lever 20, pivotally mounted upon one of the frame-standards 1 and connected, by means of a link 21, with an arm 22, provided upon one end of the rod 3. The movement of this lever from the position shown in solid lines in Fig. 3 to the position shown in dotted lines will cause the lowering of the work-table, and the opposite movement will cause its elevation. The movement of the lever in raising the work-table is assisted by means of the counterweight 15, carried by the arm 14, which extends from one of the links 13, and the downward movement of the work-table is in a measure counterbalanced by the same weight.

The carriage or work-table proper is supported upon bearing-rollers carried by the side bars 4, the preferred form of arrangement of the bearing-rollers being that shown in the drawings and including a series of supporting-rollers 23 near the lower margin of one of the side bars 4 and having grooved peripheries and a corresponding set of rollers 24, similarly placed upon the other side bar 4, but having smooth peripheries. Brackets 25 and 26 engage with the rollers 23 and 24, respectively, and a single roller 27 is provided at each side of the carriage to hold the bracket adjacent thereto in contact with the rollers below. In order to prevent disengagement of the brackets with the rollers 27 when the carriage reaches the end of its movement, each bracket is slightly upturned at each end, as best seen in Fig. 3 at *a*.

The rubbing and polishing mechanism of the machine consists, preferably, of a plurality of belts arranged in the manner presently to be explained; but a single belt may be employed when it is desired to cheapen the cost of manufacturing the machine, and it is unnecessary for the work to be done to employ a plurality of belts.

A driving-shaft 30 is disposed horizontally in bearings afforded by upward extensions of one of the standards 1 1, and a driven shaft 31 is similarly mounted in upward extensions of the opposite standard. The driving-shaft 30 is provided at its rear end with fast and loose pulleys 32 and 33, and between the extensions of the standard which afford bearings for the shaft a pulley 34 is provided for imparting movement to a crossed belt 35, by means of which movement in the opposite direction is imparted to a pulley 36 upon the driven shaft. At the forward end the driving-shaft 30 is provided with fast and loose pulleys 37 and 38, respectively, and these pulleys bear the polishing or rubbing belts 39 and 40. The belt 39, which is driven by the fast pulley 37, also runs over a loose pulley 41 upon the driven shaft 31, and the belt 40, which travels over the loose pulley 38, is driven by a fast pulley 42 upon the driven shaft 31. Owing to the arrangement of belts and pulleys upon the driving and driven shafts, as above described, the belts 39 and 40 are driven from different shafts and in opposite directions. One of these pulleys will be provided with coarser abrading material than the other and may for convenience be referred to as the "preliminary-smoothing" belt, while the other will be referred to as the "final-smoothing" belt. The belt 39 will preferably be the coarse preliminary-smoothing belt and the belt 40 the fine final-smoothing belt.

In order to keep the belts 39 and 40 under proper tension, I provide belt-tighteners comprising brackets 43 and 44, pivotally mounted on rods 45 and 46, respectively, and having weighted rollers or idle pulleys 47 and 48, respectively, mounted in the brackets. The belt-tighteners are of course disposed adjacent to the driving-pulleys of the belts which they respectively engage, and the idle rollers of said belt-tighteners are of suitable width to keep the belts under the desired tension.

In order to insure proper contact of the smoothing-belts with the work upon the carriage of the work-table, I provide two longitudinally-arranged supports provided with sectional shoes for engagement with the lower plies of said belts. As these shoes and supports are of precisely similar construction, only one will be described. Each support comprises a longitudinally-disposed member 50, which is supported by links 51, attached to shafts 52, which are mounted in brackets 53, arranged upon the longitudinally-disposed rods 2 2. Each of the shafts 52 bears two pairs of links 51, which are set at angles to each other, as shown, so that when the pair of links supporting one of the longitudinally-disposed members 50 is lowered the links supporting the other member 50 may be raised. Attached to each of the members 50 are a plurality of sockets 55, in which rods 56 are secured in any suitable manner. Each of the rods 56 is provided at its lower end with an elliptical spring 57, and each of the springs 57 bears a section 58 of a pressure-shoe which engages with the lower ply of one of the smoothing-belts. By means of a crank 59, attached to one of the

shafts 52, a rocking motion may be imparted to said shaft, and this movement will be communicated to the arms 51, attached to the shaft. When the shaft is in the position indicated in Fig. 1, the pressure-shoe will engage with the final-smoothing belt, and when turned through an arc of sixty degrees in the direction indicated the other shoe will be brought into engagement with the preliminary-smoothing belt and the shoe engaging the final-smoothing belt will be thrown into inoperative position.

From the foregoing description of the machine and the drawings illustrative thereof it will be clearly seen that the threaded shafts 7 afford means whereby the height of the work-table may be accurately adjusted to correspond to any given thickness of work, and the links by means of which said shafts are supported form means whereby the work-table, with the work mounted thereon, may be quickly raised and lowered in order to bring the work into position for the action of the smoothing-belts or to move it from such position, as desired. The arrangement of the two belts for preliminary and final smoothing makes it possible after the work has passed through the machine in one direction for a preliminary smoothing to effect the final smoothing upon the return movement, and the arrangement of the mechanism for driving the belts in opposite directions insures as near an approach to the effect obtained by hand-smoothing as is possible in a machine employing belts as the means for carrying the abrading or smoothing material. By making use of pressure devices having the shoes formed in sections and having a separate spring for each section the belts are brought into close engagement with the work in spite of any slight irregularities in the surface thereof, and hence the machine is adapted to work upon surfaces in which it is desired to preserve small irregularities of surface. It is of course to be understood that the number of sections into which each pressure-shoe may be divided can be considerably increased and the forms of the sections may be varied, if desired. For ordinary flat work the shoe-sections illustrated are entirely satisfactory, and they present substantially continuous pressure-surfaces, each shoe-section being beveled at its ends, so as to slightly overlap, and the ends being so beveled with reference to the direction of movement of the belt that they will oppose a minimum resistance to the passage of the belt when the several sections are unevenly depressed.

Among the special advantages of the improved smoothing and polishing machine may be noted the means employed for raising and lowering the work-table to bring the work into contact with the smoothing-belts and to lower it out of contact therewith. By mounting the shafts carrying the side bars 4 upon toggle-links and attaching one member of each pair of links to the rod or shaft 3 simultaneous movement of both pairs of links is assured and immediate action in response to the operating-lever is obtained. The provision of the counterweight-arm upon one of the toggle-links insures the easy movement of the table, and by adjusting the counterweight of the arm the counterweight may be made to oppose the movement of the work-table to an extent proportionate to the weight of the work upon the table.

In operating the machine the work will be secured upon the reciprocating carriage in any suitable manner, the weight of the work being ordinarily sufficient to hold it in position. The carriage will then be advanced under the smoothing-belt which is in operative position until the end of its movement is reached and then reverse in the direction of movement to return to its initial position. Ordinarily when the machine is provided with separate belts for the preliminary and final smoothing the preliminary-smoothing belt will operate upon the work as the table makes its first movement, and at the end of that movement the final-smoothing belt will be thrown into operative position and the final smoothing will be accomplished upon the return movement of the work.

It is obvious that belts carrying abrading materials of any desired degree of fineness may be employed and that by selecting the abrading materials judiciously in view of the character of the work to be done results of the most satisfactory character may be obtained.

Having thus described the construction and operation of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a machine of the character specified, the combination with a frame, of a smoothing element, a work-table, a pair of vertically-slidable table-supporting members mounted upon said supporting structure, toggle-links supporting each slidable member, means for controlling the toggle-links to raise and lower the table-supporting members quickly through comparatively long paths, and other means for raising and lowering said members independently of the toggle-links more slowly and through shorter paths to attain a finer adjustment of the table.

2. In a machine of the character specified, a suitable supporting structure, a smoothing element, a work-table disposed beneath said smoothing element, vertical sliding members upon which said work-table is adjustably mounted, a pair of toggle-links upon which each of said sliding members is supported, and a counterweight connected with each pair of links.

3. In a machine of the character specified, a suitable supporting structure, a smoothing element, a work-table, supporting devices for said work-table including a pair of threaded shafts arranged for vertical sliding movement in said supporting structure, a screw-threaded adjustable connection between the shafts and the table, and means for raising and lowering said sliding members without rotation thereof.

4. In a machine of the character specified, a suitable supporting structure, a smoothing element, a work-table, a pair of vertical sliding members upon which said work-table is adjustably mounted, a pair of toggle-links for each of said sliding members, and a rock-shaft upon which both pairs of toggle-links are supported, one member of each pair of links being rigidly attached to the shaft.

5. In a machine of the character specified, a supporting-frame, a smoothing element, a work-table, a pair of vertical rotatable threaded shafts, step-bearings for the lower ends of the shafts, means connected to the step-bearings for elevating the same, threaded bearings carried by the table and receiving the threaded portions of the shafts, and means to rotate the shafts in the step-bearings to raise and lower the table upon the shafts.

6. In a machine of the character specified, a supporting-frame, a smoothing element, a rock-bar, a controlling-lever for the rock-bar, toggle-links connected to the bar, a step-bearing carried by the links, a vertical shaft rotatably supported in the step-bearing and having a threaded portion, a work-table having a threaded bearing adjustably receiving the threaded part of the shaft, and means for rotating the shaft in its bearing to raise and lower the work-table.

7. In a machine of the character specified, a supporting-frame, a smoothing element, a vertically-adjustable work-table, a vertically-movable supporting device upon which the work-table is supported, means connected to the supporting device for quickly moving it through a relatively long path, and other means for raising and lowering the work-table more slowly and through a shorter path to obtain a finer adjustment of the work-table.

8. In a machine of the character specified, a suitable supporting structure, a work-table, a smoothing-belt having the lower ply thereof arranged for contact with the work mounted on said table, and pressure devices above said belt, said pressure devices including a supporting member extending longitudinally between the plies of the belt, a rock-shaft near each end of the supporting member, an arm rigidly mounted on each shaft and pivotally connected with said supporting member and a pressure-shoe made up of a series of independent shoe-sections yieldably mounted on the under surface of said supporting member in coöperative relation with the lower ply of the belt.

9. In a machine of the character specified, a suitable supporting structure, a work-table, a smoothing-belt having the lower ply thereof adapted for engagement with the work mounted on said table, and a pressure device disposed between the plies of said belt, said pressure device including a longitudinally-disposed supporting member, a pair of rock-shafts disposed transversely of said supporting member, an arm on each shaft pivotally connected with said supporting member and a series of shoe-sections disposed beneath said supporting member in coöperative relation with the lower ply of the belt and each having an independent yieldable connection with said supporting member.

10. In a machine of the character specified, a suitable supporting structure, a work-table, a smoothing-belt having the lower ply thereof adapted to engage the work carried by said table, and pressure devices disposed between the lower and upper plies of said belt and including a longitudinally-arranged supporting member, a series of independent elliptical springs arranged beneath said supporting member and carried thereby and independent shoe-sections carried by said elliptical springs in coöperative relation with the lower ply of the belt, one shoe-section being mounted upon each spring.

11. In a machine of the character specified, the combination with a work-table, of abrading-belts traveling in opposite directions across the table, individual means for pressing the belts into operative relation with respect to the work-table, and means connecting the individual pressing means to maintain one of them active and the other inactive.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

JOHN W. MADDOX.

Witnesses:
JAMES I. FOWLER,
FLORENCE E. TERRY.