W. LA HODNY.

POLISHING MACHINE.

APPLICATION FILED AUG. 27, 1917.

1,345,374.

Patented July 6, 1920.

2 SHEETS—SHEET 1.

Fig. 1.

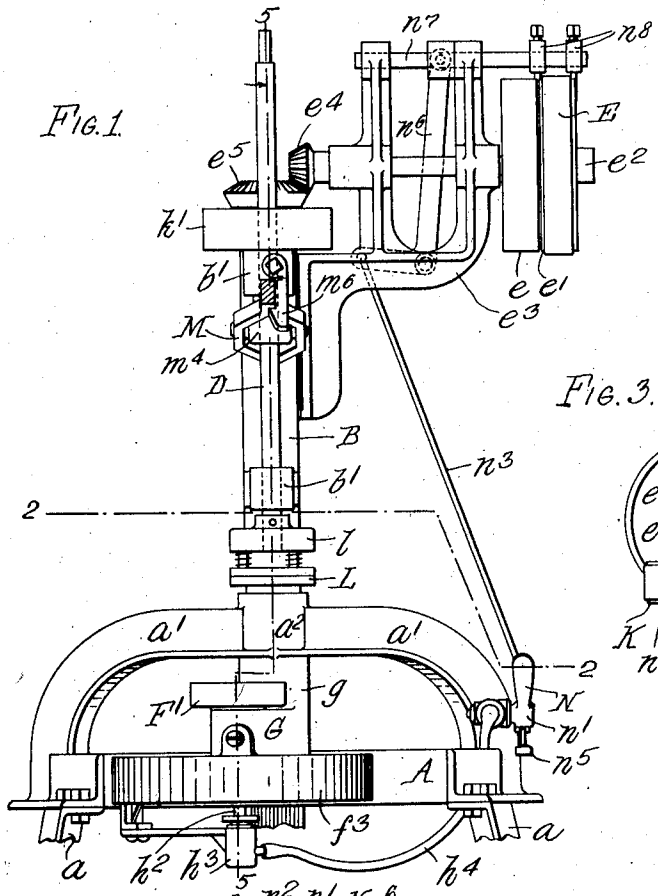


Fig. 4.

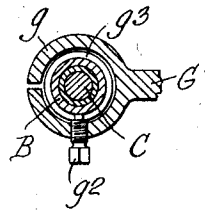


Fig. 3.

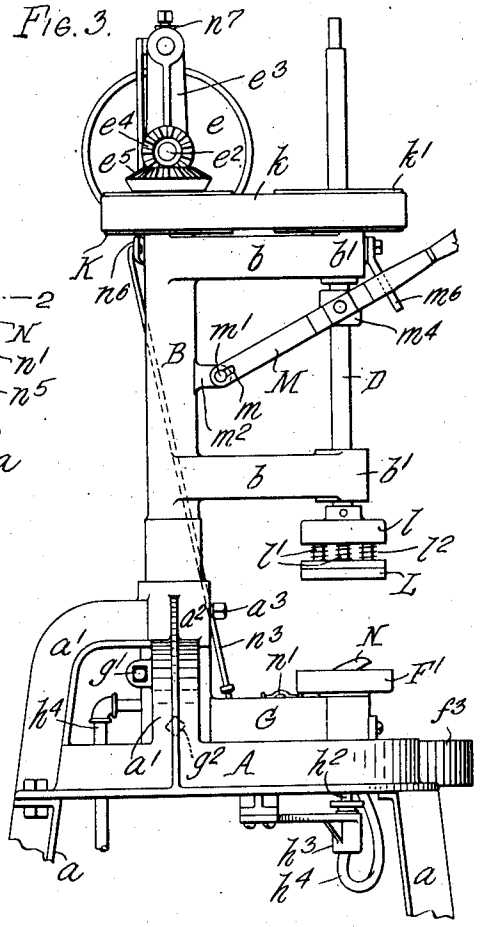
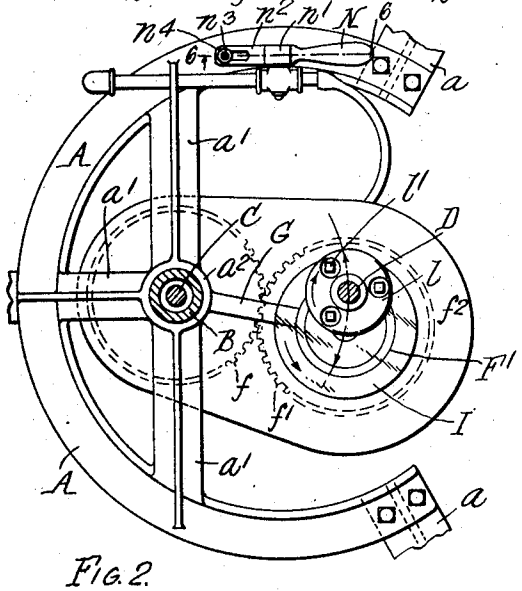


Fig. 2.



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2 SHEETS—SHEET 2.

FIG. 5.

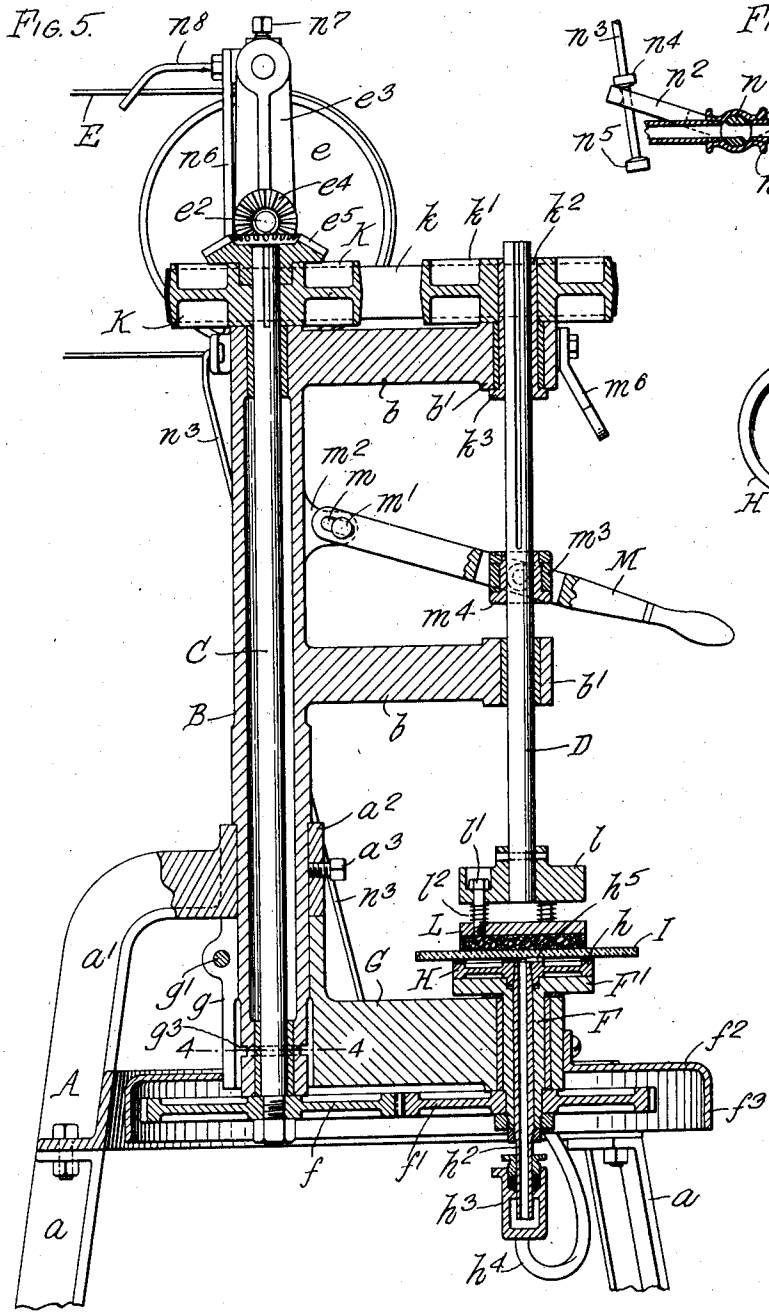


FIG. 6.

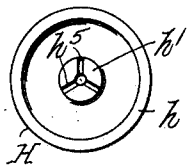


FIG. 7.

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POLISHING-MACHINE.

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To all whom it may concern:

Be it known that I, WILLIAM LA HODNY, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Polishing-Machines, of which the following is a specification.

This invention relates to machines for polishing mirrors, glass plates or analogous articles, which have a polishing member which rotates while pressed against the object to be polished.

The objects of the invention are to provide a machine of this kind in which the article to be polished and the polishing head revolve relatively to each other in such a manner that all parts of the surface to be polished will be subjected to substantially the same polishing action, and by means of which small articles can be properly and perfectly polished with the minimum amount of labor; also to provide a machine of this kind with a work table or chuck which is adjustable to properly present articles of different sizes to the rotary polishing head; also to provide a machine of this kind having a vacuum chuck for the work and means for automatically stopping the rotation of the polishing head before breaking the vacuum which holds the work on the chuck; also to improve the construction of machines of this kind in other respects hereinafter specified.

In the accompanying drawings:—

Figure 1 is a front elevation of a polishing machine embodying the invention, the supports or legs of the machine being partly broken away.

Fig. 2 is a sectional plan view thereof on line 2—2, Fig. 1.

Fig. 3 is a side elevation thereof.

Fig. 4 is a fragmentary horizontal section thereof on line 4—4, Fig. 5.

Fig. 5 is a longitudinal sectional elevation thereof on an enlarged scale on line 5—5, Fig. 1.

Fig. 6 is a fragmentary sectional elevation thereof on line 6—6, Fig. 2.

Fig. 7 is a top plan view of a suction head for holding the articles.

Briefly stated, the polishing machine embodying the invention, which is shown in the drawings, includes a polishing head which rotates about a fixed axis and a work support or chuck which rotates about an axis eccentric to the polishing head. The polishing head is preferably so arranged with regard to the work that the peripheral portions of the polishing head extend slightly over the center of the article to be polished. The polishing head is preferably made of slightly greater diameter than the radius of the article to be polished and revolves in the reverse direction so that the relative movement between the polishing head and the article to be polished is great and is substantially uniform at all parts of the article.

The frame of the machine shown in the drawings includes an arc shaped frame portion or member A supported on the legs a and having upwardly and inwardly extending arms a', the upper ends of which are preferably formed integral with a sleeve a^2 which supports an upright tubular frame member B. This frame member incloses and has bearings for a shaft C for actuating the work support and is also provided with arms b having bearings b' in their outer portions for a shaft D to which the polishing head is connected. The tubular frame member B is preferably secured in the sleeve a^2 by means of a set screw a^3.

Any suitable means may be employed for driving the two shafts C and D. In the construction shown, power is transmitted to the machine by means of a belt E adapted to engage with tight or loose pulleys e e' mounted on a shaft e^2 which is suitably journaled in a bracket e^3 secured on the tubular frame member B. The shaft e^2 is connected with the shaft C by beveled gears e^4 and e^5. The lower end of the shaft C is provided with a gear f meshing with a gear f' secured on a spindle F on which the work supporting head F′ is mounted.

The spindle F is journaled in a bracket or arm G which is adjusted with regard to the axis of the shaft D. In the construction shown the bracket or arm G is adjustable about the axis of the shaft C, being for this purpose provided with a split sleeve g embracing the lower end of the tubular frame member B. The split sleeve g may be clamped in any desired position on the tubular frame member B by the bolt g' or other suitable means for holding the bracket or arm G in a fixed position in regard to the frame member B. The arm or bracket G is held against vertical movement by means of a set screw g^2, Fig. 4, the inner end of which engages in an annular slot or

groove g^3 in the periphery of the frame member B. Since the arm G is adjustable about the axis on which the gear f turns, the work supporting head may be adjusted about the frame member B to any desired position without moving the gears f f' out of mesh, and by the adjustment of the arm or bracket G relatively to the polishing head the machine may be readily adapted to operate on articles of different sizes. f^2 represents a guard plate having downwardly extending flanges f^3 which form a housing for the gears and protect the same from grit or dust from the polishing head as well as shielding the operative from contact with the gears.

Means of any suitable kind may be employed for holding the work supporting head, those shown in the construction illustrated including a plate or chuck H having an upwardly extending peripheral flange h and a central article supporting portion h' forming between therein a suction cavity. Both of the supporting portions are provided with pads of rubber or other suitable yielding material. The chuck H is connected with the upper end of an upright tube h^2 which extends through the spindle F of the work supporting head. The lower end of this tube terminates in a stuffing box h^3 which is connected by means of a tube or pipe h^4 with a suction pump or the like (not shown). The article supporting portion h' of the chuck H is provided with radial slots or passages h^5 through which the suction from the pipe h^2 is transmitted to the suction cavity in the upper portion of the chuck H. The suction will firmly hold the article I to be polished on the chuck.

Power is transmitted from the shaft C to the shaft D of the polishing head in the construction shown by means of a pulley K secured to the shaft C and connected by means of a belt k to a pulley k' which is rigidly secured to a sleeve k^2 having a lower flanged portion k^3 bearing against the lower pad of the upper arm b which serves to hold the pulley k' against vertical movement. The sleeve k^2 is splined to the shaft D so as to turn the shaft D and permit this shaft to be moved up and down with regard to the sleeve k^2. The lower end of the shaft D is provided with a plate or disk l to which the polishing head L may be yieldably and movably secured by any suitable means, such for example as bolts l' secured to the polishing head L and slidable vertically in the plate or disk l. Springs l^2 interposed between the plate or disk l and the polishing head L permit the polishing head to tilt or shift as necessary to bear properly on the work and produce a yielding pressure upon the article to be polished.

The shaft D may be moved up and down to bring the polishing head into and out of engagement with the article by any suitable means. In the construction shown, a hand lever M is employed for this purpose, which is provided at one end with a slot m through which a pin m' extends which is secured in brackets m^2 of the tubular frame member B. Intermediate of its ends, the lever M is provided with a loop shaped portion which is pivotally connected with a ring m^3 which is journaled on a spool m^4 secured to the shaft D. By means of the lever M the shaft D and the polishing head connected therewith may be moved into and out of engagement with the article to be polished and any desired pressure may be exerted upon the polishing head. m^6 represents a detent or dog adapted to engage the lever for holding the polishing head in a raised or inoperative position.

In the operation of the machine the work and the polishing head revolve at substantially the same velocity and in opposite directions, thus producing a rapid relative motion between the polishing head and the work and causing the machine to polish very rapidly. By arranging the work eccentrically with regard to the polishing head in such a manner that the polishing head extends from approximately the middle portion of the work to the edge thereof, the relative velocities between the contacting parts of the work and polishing head are substantially the same throughout all parts of the work. Consequently, a uniform and perfect polishing action is secured at all parts of the work. The machine can readily be adapted for operating on articles of different sizes by replacing the polishing head L and chuck H with a larger or smaller polishing head or chucks and adjusting the arm G with regard to the axis of the shaft D in such a manner that the polishing head will have the proper eccentric relation with regard to the work regardless of the diameter of the work. The article to be polished is placed on the suction chuck while the parts of the machine are at a standstill. The suction is then turned on to hold the article securely in place before the rotation of the chuck and polishing head is started and after the polishing operation has been completed the polishing head and chuck should be stopped before the suction is turned off. In order to accomplish this and insure of the suction being turned on whenever the machine is in operation, a valve for controlling both the suction and the operation of the machine is preferably employed. The control lever shown in the drawings for this purpose comprises a handle N connected with the stem n of a valve n' which is arranged in the suction pipe h^4. The handle N has an extension or arm n^2 which is preferably slotted and through which a rod n^3 connected with the belt shifting mechanism extends. The rod n^3 is provided with knobs

or projections n^4 n^5 adapted to engage the arm n^2 to cause the arm to shift the rod n^3. The upper end of the rod n^3 is connected to one arm of a bell crank lever n^6, the other arm of which is connected with a belt shifter n^7 slidably arranged in the bracket e^3 and having the usual fingers n^8 which are adapted to move the belt from one to another of the pulleys e e'. By means of this arrangement the movement of the handle N in one direction will first open the suction valve to apply the suction and then shift the belt E from the loose to the tight pulley. When actuated in the reverse direction the handle N first shifts the belt E from the tight to the loose pulley and then shuts off the suction. In this way the chuck is stationary when the article is being secured thereon and removed. This prevents the possible cutting of the operative's hands, enables the work to be properly adjusted in the chuck and prevents the breaking of articles by improper actuation of the machine and makes it possible to have the machine operated by unskilled labor. The machine described is primarily intended for polishing flat surfaces, but it is not intended to limit the invention to such use since the same may be employed for grinding or analogous purposes.

I claim as my invention:—

1. The combination of a frame, a rotary polishing member journaled on said frame, a rotary work supporting member arranged on said frame to turn in a plane substantially parallel with the plane of rotation of the polishing member, and means for adjusting said work supporting members relatively to said polishing member for varying the eccentricity of the work supporting member in regard to said polishing member.

2. The combination of a frame, a polishing head rotatably mounted on said frame, a work supporting member rotatably mounted on said frame, means for rotating said polishing head and said work supporting member in substantially parallel planes in opposite directions, and means for initially adjusting said work supporting member and polishing head relatively to each other to vary the distance between the axes of rotation of said polishing head and work supporting member when changing from one size of work to another.

3. The combination of a frame having a substantially upright member, a polishing head rotatably mounted on said upright member, and a rotary work supporting table arranged at the lower end of said upright member and adjustable laterally in regard to said polishing head for varying the eccentricity of said head and table.

4. The combination of a frame having an upright tubular frame member provided with laterally extending arms, a polishing member mounted on an upright shaft journaled in said arms, a work supporting table supported from the lower end of said upright member, a driving shaft for said work supporting table extending through said tubular frame member, and means for adjusting said work supporting table about the axis of said drive shaft.

5. The combination of a frame, a polishing head mounted on said frame and rotatable about a substantially vertical axis, a work supporting member rotatable in a direction opposite to said polishing head, and an arm adjustably mounted on said frame and supporting said work supporting member, said arm being adjustable to vary the distance between the axis of rotation of said work supporting member and polishing head.

6. The combination of a polishing member, a rotary work supporting member, suction means on said supporting member for holding the work thereon, means for transmitting suction to said rotary member, means for starting and stopping the rotation of said work supporting member, and a connection between said starting and stopping means and said means for transmitting suction to said rotary member for turning off the suction from said supporting member after the supporting member has been stopped and for turning on the suction to said supporting member before said member is started.

7. The combination of a rotary polishing head, a work supporting rotary member, suction means on said rotary member for holding the work thereon, means for transmitting suction to said rotary member, means for simultaneously starting and stopping the rotation of said polishing head and said rotary member, and a connection between said starting and stopping means and said means for transmitting suction to said rotary member adapted to turn off the suction from said rotary member after the rotation of said polishing head and said rotary member has been stopped and to turn on the suction to said rotary member before the rotation of said polishing head and said rotary member is started.

8. The combination of a rotary polishing member, a rotary work supporting member, suction means on said supporting member for holding the work thereon, and a device for controlling the applying and shutting off of suction to said supporting member, said device being provided with means adapted to start the rotation of said members after the suction has been applied to the supporting member and to stop the members before the suction is broken in said supporting member.

9. The combination of a polishing head, a rotary work supporting member, suction means on said supporting member for hold-

ing the work thereon, a device for controlling the applying and shutting off of suction to said supporting member, means for starting and stopping the rotation of said polishing head and said supporting member, and a connection between said device and said starting and stopping means.

10. The combination of a polishing member, a rotary work supporting member, suction means on said supporting member for holding the work thereon, a valve for controlling the suction in said supporting member, means for starting and stopping the rotation of said supporting member, and a lost motion connection between said valve and said starting and stopping means whereby the suction is applied to said supporting member before the same is started and the suction is turned off from said supporting member after the same has been stopped.

Witness my hand this 25 day of August, 1917.

WILLIAM LA HODNY.

Witnesses:
C. W. PARKER,
M. J. PITMAN.