W. LA HODNY.

GRINDING AND POLISHING MACHINE.

APPLICATION FILED MAR 5, 1909.

944,678. Patented Dec. 28, 1909.

4 SHEETS—SHEET 1.

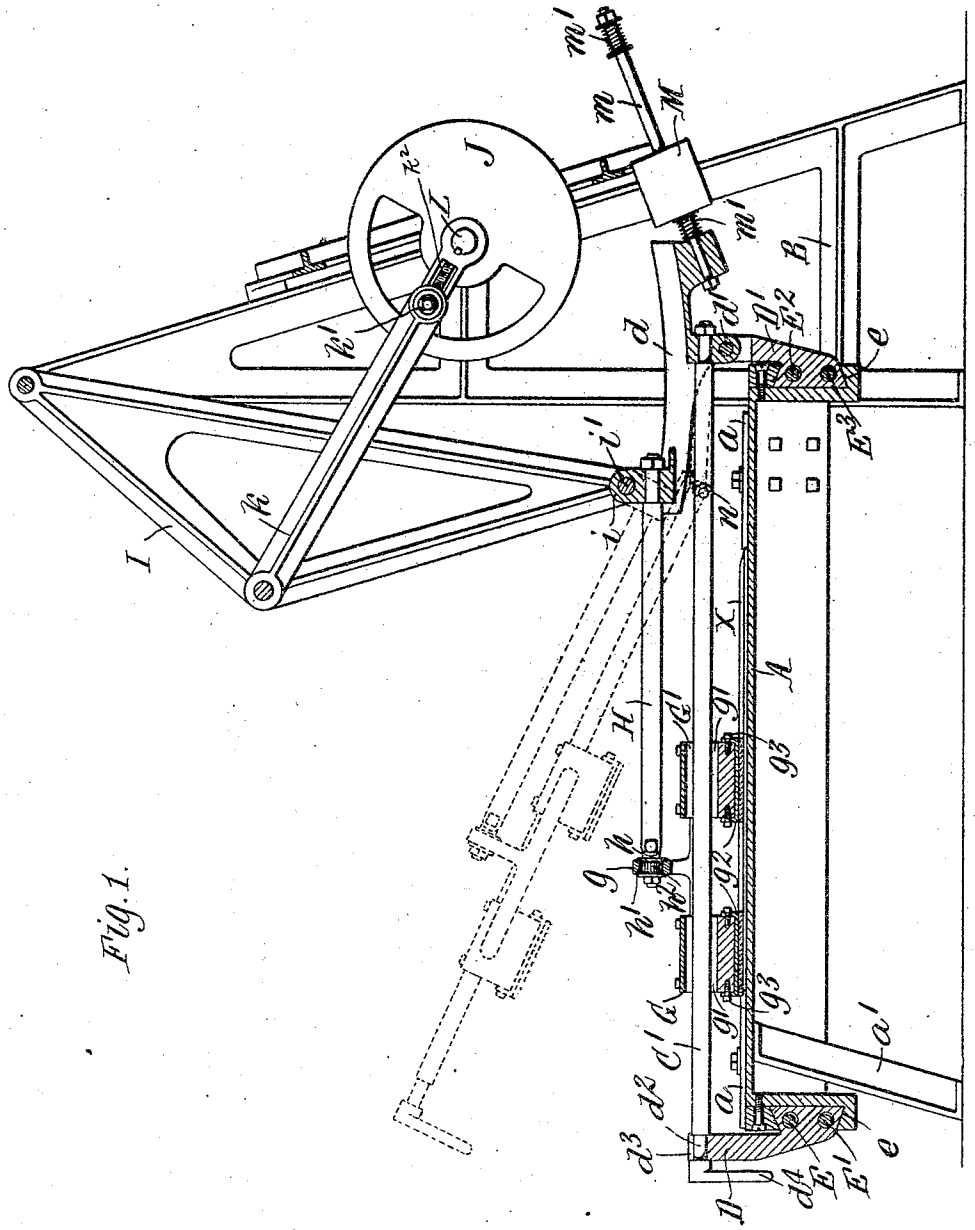

Fig. 1.

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4 SHEETS—SHEET 2.

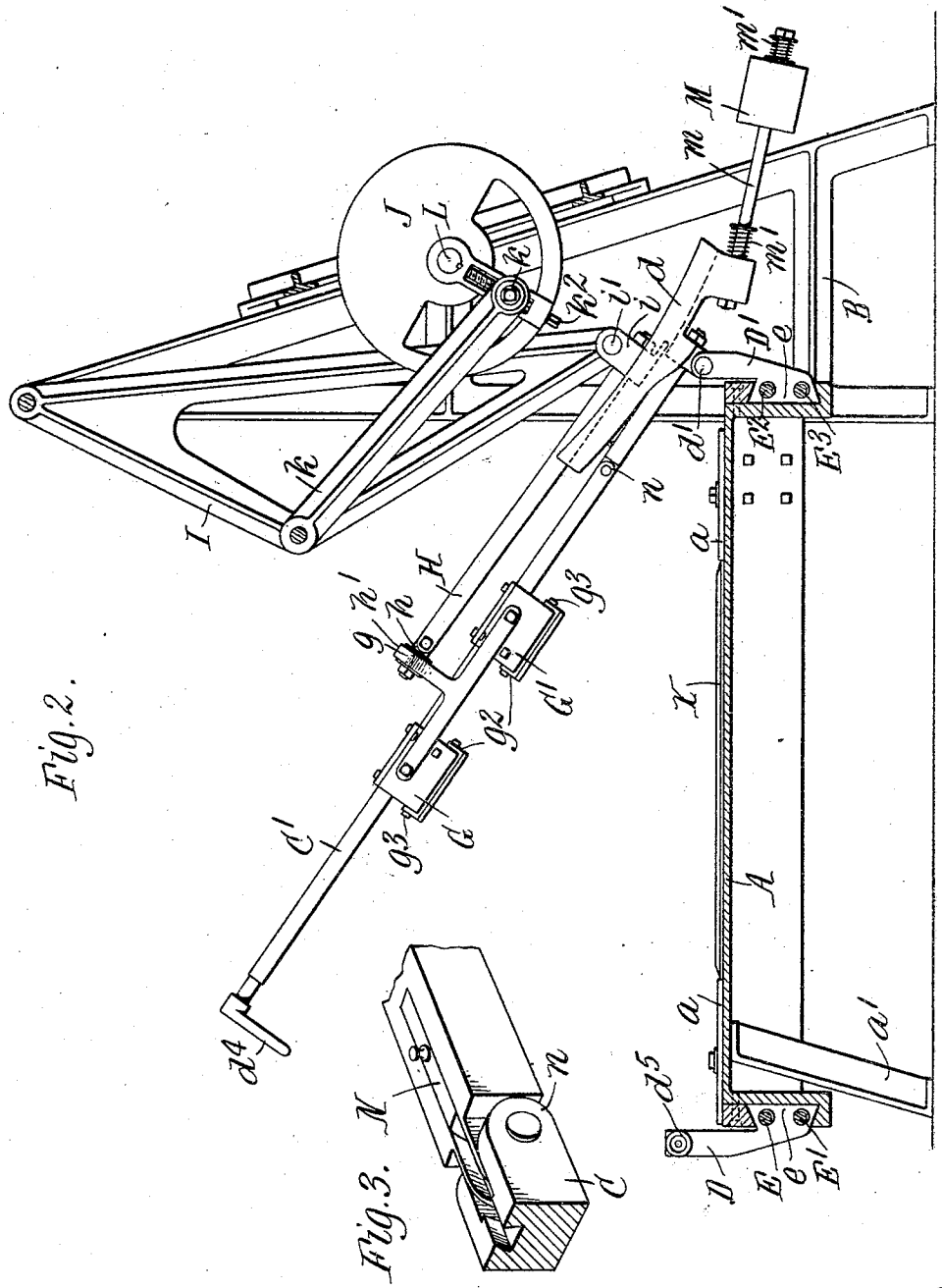

Fig. 2.

Fig. 3.

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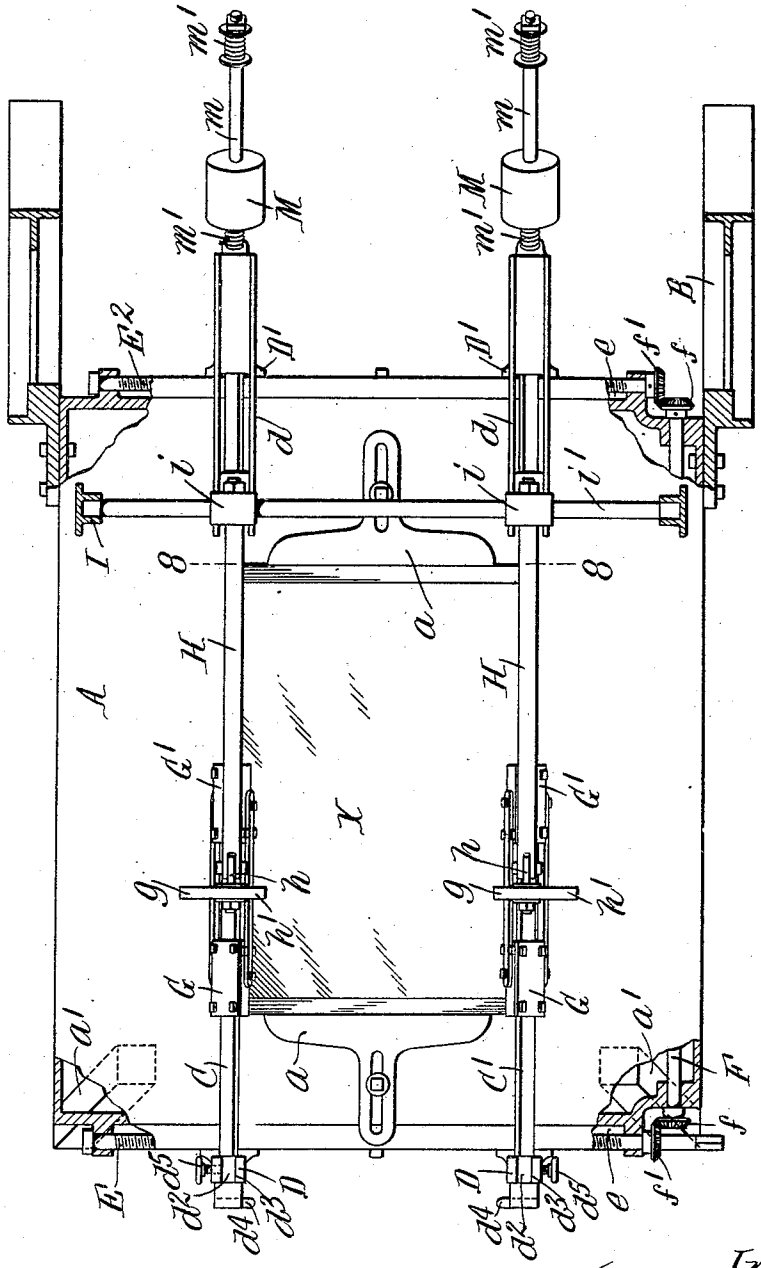
4 SHEETS—SHEET 3.

Fig. 4.



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4 SHEETS—SHEET 4.

Fig. 5.

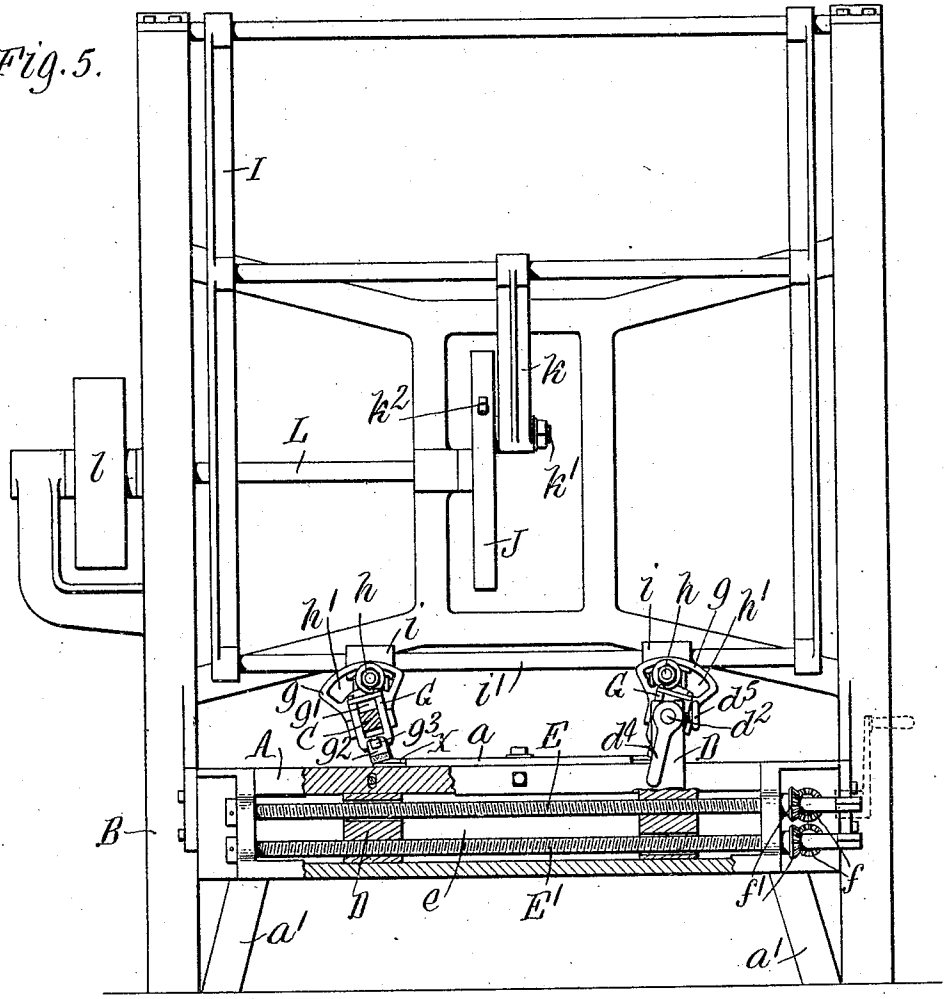


Fig. 6.

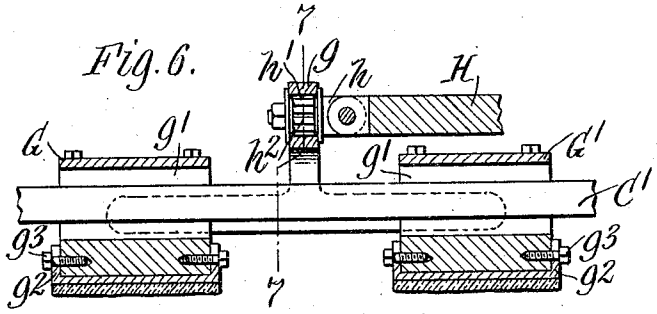


Fig. 7.

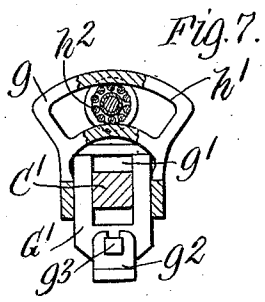
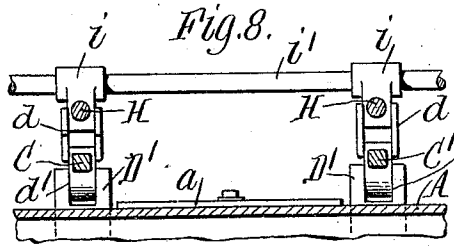


Fig. 8.



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UNITED STATES PATENT OFFICE.

WILLIAM LA HODNY, OF BUFFALO, NEW YORK.

GRINDING AND POLISHING MACHINE.

944,678. Specification of Letters Patent. **Patented Dec. 28, 1909.**

Application filed March 5, 1909. Serial No. 481,347.

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 Grinding and Polishing Machines, of which the following is a specification.

This invention relates to machines for grinding and polishing plane surfaces, and more particularly for polishing the beveled edges of mirrors.

The primary object of the invention is to produce an efficient and desirable machine of practical and economical construction which will rapidly produce a uniformly excellent polished surface, and which can be readily and easily operated and adjusted.

Other objects of the invention are to provide the machine with means whereby the reciprocating polishing devices can be quickly set to operate upon mirrors of different sizes and can also be readily adjusted angularly and laterally by the operator from time to time as may be necessary to cause them to properly bear on the surface being polished, or on different desired portions of the surface, so as to insure the best results, without stopping the machine; also to mount the polishing devices so that they can be thrown up away from the work table and supported in the raised position to enable the work to be secured or adjusted on the table and removed; and also to improve glass-polishing machines in the respects hereinafter described and set forth in the claims.

The machine hereinafter described and shown in the drawings is designed primarily for polishing the beveled edges of mirrors, but it will be apparent from the following description that the machine is adapted too for grinding bevel edges, and can also be used for grinding and polishing flat surfaces.

In the accompanying drawings, consisting of four sheets: Figure 1 is a longitudinal sectional elevation of a glass polishing machine embodying the invention, showing the polishing devices in operative position. Fig. 2 is a side elevation partly in section thereof, showing a different position of the parts. Fig. 3 is a sectional perspective view of the hinge joint of the guide rails for the polishing devices. Fig. 4 is a plan view, partly in horizontal section, thereof. Fig. 5 is a front elevation, partly in section, thereof. Fig. 6 is a longitudinal sectional elevation, on an enlarged scale, of one of the polishing devices and its guide. Fig. 7 is a transverse sectional elevation thereof, in line 7—7, Fig. 6. Fig. 8 is a fragmentary transverse sectional elevation of the machine in line 8—8, Fig. 4.

Like letters of reference refer to like parts in the several figures.

A represents a stationary horizontal bed or table on which the glass or work X is secured between suitable adjustable clamps *a* at its front and rear ends. The table may be of any suitable construction, being, in the construction illustrated, provided with legs *a'* at its front end and secured at its rear end to an upright main frame B on which the drive mechanism for the polishing devices is mounted.

C C' represent two guide rails or bars for the reciprocating polishing devices, which rails normally extend horizontally fore and aft of the machine above the table A and are supported by bearings D and D' at the front and rear ends of the table which are slidably mounted for adjusting the guide rails laterally or crosswise of the table. In the construction shown, the guide rails are square in cross section and are swiveled at their rear ends to curved guides *d* which are hinged at *d'* (see Fig. 1) to swing vertically on the rear bearings D', and the guide rails are provided at their front ends with cylindrical portions d^2 adapted to rest loosely in open seats d^3 in the front bearings D. The guide rails are thus adapted to be turned axially to different positions in their bearings D D' and their front ends can be lifted out of the seats d^3 and swung upwardly, as shown in Fig. 2. Handles d^4, Figs. 1 and 2, are preferably provided at the front ends of the guide rails for turning them, and set screws d^5, Figs. 2 and 4, are provided on the front bearings D for securing the guide rods against turning in their bearings when they have been adjusted to the correct position.

The bearings D D' for the guide rails are arranged to slide in transverse ways *e* at the front and rear ends of the table in which they are adapted to be adjusted by screws E E' and E^2 E^3 at the front and rear ends respectively of the table. These screws are journaled in bearings on the table and pass through holes in the slide bearings, and the adjusting screws E and E^2 at opposite ends

of the table have screw-threaded engagements with the bearings D D′ for one guide rail C′ and are connected by a longitudinal shaft F journaled at one side of the table and bevel gears *f f′*, Figs. 4 and 5, while the other screws E′ and E³ have screw-threaded engagements with the bearings D. D′ for the other guide rail C, and are similarly connected by a longitudinal shaft and bevel gears, so that the front and rear screws for each guide rail will turn together and produce corresponding adjustments of the opposite ends of the guide rail when one screw is turned, to keep the guide bars always parallel with the edges of the work. One end of each of the front adjusting screws is suitably fashioned to receive a crank handle for turning the screws. The guide rails could be differently mounted to turn axially and swing vertically in suitable transversely movable bearings, and the bearings can be movably supported and adjusted transversely of the table in any other suitable way.

A polishing device is mounted to reciprocate on each guide rail C and C′. Each polishing device, see Figs. 1, 6 and 7, preferably consists of two weighted blocks G G′ which are pivoted to a yoke *g* so that they are allowed to tilt slightly. The blocks G G′ have longitudinal openings *g′* through which the guide rails pass and which are of a shape to permit the blocks to rise and fall to accommodate themselves to the surface being polished but to prevent lateral play of the blocks on the guide rails.

g² represents detachable shoes which are furnished with polishing pads and are removably fastened on the bottoms of the blocks G G′ by screws *g³* in the ends of the blocks adapted to engage slotted lugs at the ends of the shoes. These shoes can be detached from the blocks by simply loosening the screws *g³* and pulling the shoes downwardly off of the blocks without removing the screws *g³*, so that one set of shoes suitable for bevels of one width can be readily detached and replaced by another set of shoes suitable for bevels of a different width or for producing work of a different character.

The polishing devices are joined by connecting links or rods H to a swinging lever or frame I which is hung on the upper portion of the main frame B and is oscillated by suitable drive mechanism for reciprocating the polishing devices on the guide rails. The connecting rods H shown are provided with hinged front ends *h*, Figs. 6 and 7, which are slidably secured in curved slots in transverse arch-portions *h′* of the yokes *g* of the polishing devices and are furnished with roller bearings *h²* whereby the connecting rods can slip freely in the yokes when the guide rails C C′ are turned axially to set the polishing devices at a desired angle. The rear ends of the connecting rods H are secured to slide blocks *i*, Figs. 1 and 8, which are loosely hung on a horizontal cross-bar *i′* at the lower end of the swinging frame or lever I and in the oscillations of this frame, slide back and forth between the spaced side pieces of the curved guides *d* to which the rear ends of the guide rails C C′ are swiveled. As these guides *d* are hinged to the rear bearings D′ for the guide rails, as before described, they normally hold the slide blocks *i* from sidewise movement on the cross-bar *i′*, but move the slide blocks along on the cross-bar *i′* when the guide rails C C′ are adjusted laterally or crosswise of the table.

The swinging frame or lever I is preferably oscillated by a crank wheel J to which the frame is connected by a pitman *k*. The wrist pin *k′* of the crank wheel is adjustable radially on the wheel by a screw *k²* in a well known manner for regulating the throw of the frame or lever I and the length of travel of the polishing devices G G′. The crank wheel is secured to a drive shaft L which is journaled in bearings on the main frame B and is provided with a pulley *l* for a drive belt. Any other suitable drive mechanism for the swinging frame or lever I could be employed.

M represents weights which are preferably employed for counterbalancing the weight of the guide rails and polishing devices. The weights are slidably mounted on rods *m* secured to the curved guides *d* and normally extending rearwardly at an upward inclination therefrom. When the front ends of the guide rails C C′ are lifted to raise the polishing devices away from the work, as shown in Fig. 2, the weights M slide rearwardly on the rods *m* away from the hinges for the guide rails and hold the rails up, and when the guide rails are again lowered to the horizontal operative position the weights slide forwardly toward the hinges where their weight is not sufficient to lift the guide rails. *m′* represents cushioning springs on the rods *m* for the sliding weights.

If the machine should be stopped with the swinging frame I in its forward position, as shown in Fig. 1, the frame I will prevent the guide rails from being swung up on their hinges *d′*, and to avoid the necessity of turning the drive shaft L to retract the swinging frame, the guide rails C C′ are preferably formed between their ends with hinge joints *n*, which permit the front sections of the rails to be swung upwardly, as indicated by dotted lines in Fig. 1. Bolts N, Fig. 3, arranged to slide in dovetail grooves in the rail sections at the hinge joints *n*, are provided for holding the joints stiff during the operation of the machine.

In the use of the machine the glass X is

secured in place on the table A while the guide rails C C′ with the polishing devices G G′ are raised as shown in Fig. 2, and the guide rails are lowered until their front ends rest in the seats in the front bearings D. The guide rails are then moved laterally by the adjusting screws E E′ to place the polishing devices over the opposite beveled edges of the glass and the guide rails are turned in their bearings to cause the polishing devices G G′ to bear flat against the bevel edges and are secured by tightening the set screws d^5, after which the drive mechanism is started to reciprocate the polishing devices. After the mechanism is started, if it is found that the polishing blocks G G′ do not bear flat on the bevel surfaces, or do not properly cover the surfaces, they can be adjusted to the proper position by turning the guide rails in their bearings and shifting them laterally, as explained. Owing to the described manner of mounting the guide rails and connecting the polishing devices to the swinging frame I, these adjustments can be made without stopping the polishing devices, which is a great advantage, as the operative can see by the streaks made on the glass by the polishing devices when they are in proper position and can adjust the polishing devices from time to time as may be necessary to properly regulate the polishing.

The machine shown has two independently adjustable polishing devices which operate simultaneously on the opposite parallel edges of the glass, but manifestly the construction permits of the use of a greater or less number of the polishing devices. When operating on small glasses, or the narrow ends of glasses, two glasses can be secured on the table, one in advance of the other, so that the front blocks G of the polishing devices will work on one glass and the other blocks on the other glass. The adjustable throw crank k permits the length of travel of the polishing devices to be regulated according to the length of the edges being operated upon.

When the machine is used for polishing, rouge and water are usually poured on the glass beneath the polishing devices, but the machine could be used for grinding by using a suitable abrasive material. As the polishing devices are connected directly to their driving mechanism and can tilt somewhat on the guide rails, the pressure is thrown on the front and rear ends of the devices as they travel respectively forwardly and rearwardly, and this improves their action and makes them cut much faster than machines where only the weight of the devices resting flat on the surface is relied upon. The machine constructed as described can also be used for either polishing or grinding flat surfaces as the polishing devices can be shifted to travel in different paths until the entire surface of the work is covered.

I claim as my invention:

1. The combination of a work table, a stationary guide over said table, a polishing device which is directed and confined laterally by said guide but has vertical play on the guide whereby it is free to tilt vertically relative to the guide, and means connected directly to said polishing device for reciprocating it on the guide, substantially as set forth.

2. The combination of a work table, a polishing device which is reciprocated above said table, and a guide for said polishing device which is rotatably adjustable for regulating the angular position of said polishing device, said guide being also adjustable laterally over said table, substantially as set forth.

3. The combination of a work table, a polishing device which reciprocates above said table, a guide for said polishing device which is rotatably adjustable for regulating the angular position of said polishing device and is adjustable laterally over said table, drive mechanism for said polishing device, and loose connections between said polishing device and drive mechanism which permit said guide to be rotatably and laterally adjusted while the drive mechanism is in operation, substantially as set forth.

4. The combination of a work table, a polishing device which is reciprocated above said table, and a guide for said polishing device which is rotatably adjustable for regulating the angular position of said polishing device and is adjustable laterally over said table, said guide being also mounted to swing upwardly away from said table, substantially as set forth.

5. The combination of a work table, a reciprocating polishing device above said table, guide means for said polishing device which hold said device in a fixed angular relation to the work but allow the device vertical play to accommodate itself to the surface of the work, said guide means being adjustable to change the angular relation of the polishing device to the work, substantially as set forth.

6. The combination of a work table, a reciprocating polishing device, a guide rail for said polishing device arranged horizontally above said table, movable bearings by which said rail is rotatably supported at its opposite ends, said rail being hinged to one of said bearings to swing vertically, and means for adjusting said bearings laterally of said table, substantially as set forth.

7. The combination of a work table, a horizontal guide rail above said table, a bearing at one end of said table to which said guide rail is connected at one end to turn axially and swing vertically, a bearing at

the opposite end of said table in which the other end of said rail is removably seated, means for securing the rail in said last mentioned bearing, means for adjusting said bearings laterally of said table, a polishing device guided by said guide rail, and means for reciprocating said polishing device, substantially as set forth.

8. The combination of a work table, a polishing device which reciprocates above said table, a guide for said polishing device which is rotatably adjustable for regulating the angular position of said polishing device and is adjustable laterally over said table, a reciprocating operating device for said polishing device, and means connecting said polishing device to said operating device and having a sliding connection with said operating device and a loose connection with said polishing device to allow the rotary and lateral adjustments of said guide, substantially as set forth.

9. The combination of a work table, a polishing device, a guide rail above said table for said polishing device, means for adjusting said guide rail laterally over the table, an oscillating frame for reciprocating said polishing device, a connecting rod attached to said polishing device and having a sliding connection with said oscillating frame, and a guide for said sliding connection connected to said guide rail whereby said connecting rod is moved with said guide rail when the latter is adjusted, substantially as set forth.

10. The combination of a work table, a polishing device, a guide rail above said table for said polishing device, means for adjusting said guide rail laterally over the table, a swinging frame having a horizontal cross rod, a slide block on said cross rod, a rod connecting said slide block to said polishing device, a guide which is connected to said rail and is engaged by said slide block, and means for oscillating said swinging frame, substantially as set forth.

11. The combination of a work table, a polishing device, a guide rail above said table for said polishing device, means for adjusting said guide rail laterally over the table, a swinging frame having a horizontal cross rod, a slide block on said cross rod, a rod connecting said slide block to said polishing device, a guide which is connected to said rail and is engaged by said slide block, and means for oscillating said swinging frame which are adjustable to regulate the throw of said frame, substantially as set forth.

12. The combination of a work table, a polishing device, a guide rail for said polishing device which is adjustable relative to the work and is pivoted at one end to swing upwardly, a weight which is movable on an extension of said guide rail toward and from the guide rail pivot for allowing the guide rail to remain in the operative position and for holding said guide rail in the raised position when lifted, and means for reciprocating said polishing device on said guide rail, substantially as set forth.

13. In a polishing machine, the combination of a reciprocating block, a shoe provided with a polishing pad and having end lugs with open slots, and screws in said block which engage said slotted lugs of the shoe for detachably securing the shoe on said block, substantially as set forth.

Witness my hand, this 26th day of February, 1909.

WILLIAM LA HODNY.

Witnesses:
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C. B. HORNBECK.