(No Model.) 2 Sheets—Sheet 1.

G. SCHWARZ.

MACHINE FOR GRINDING ELLIPTICAL GLASSES, MIRRORS, AND THE LIKE.

No. 276,084. Patented Apr. 17, 1883.

Fig. 1.

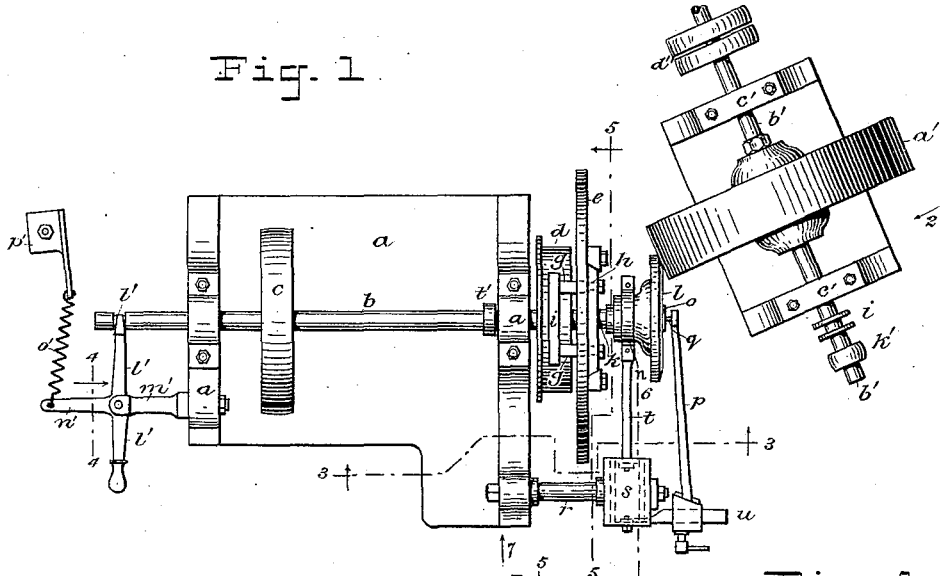


Fig. 3.

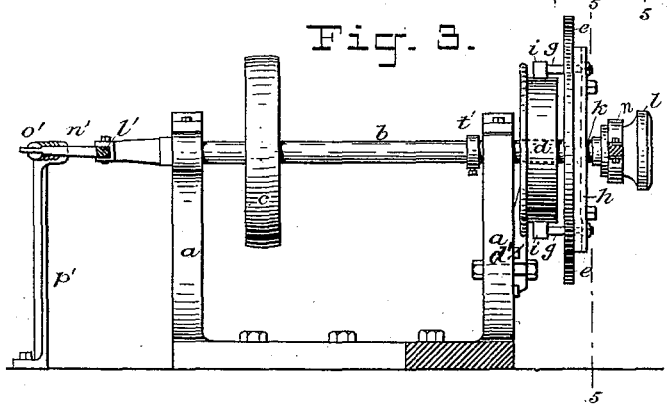


Fig. 4.

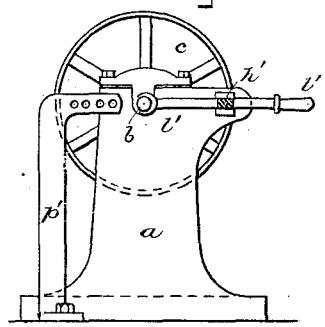
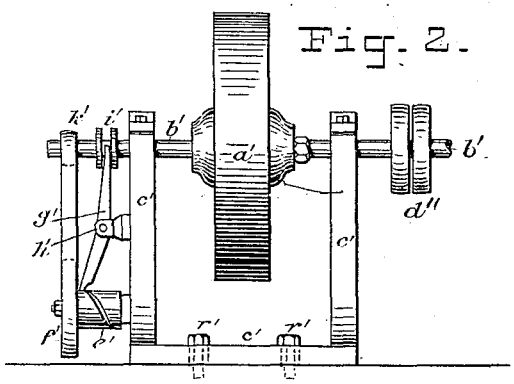


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 5.

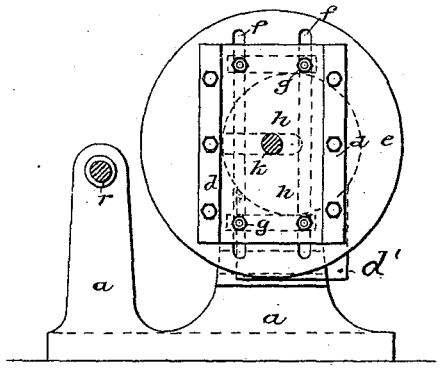


Fig. 6.

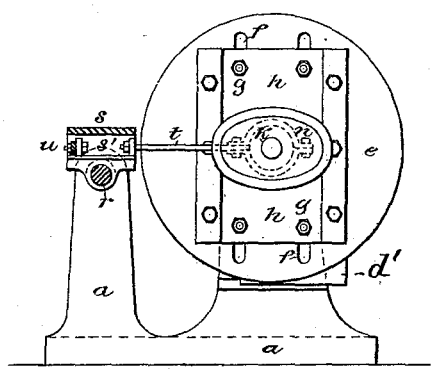
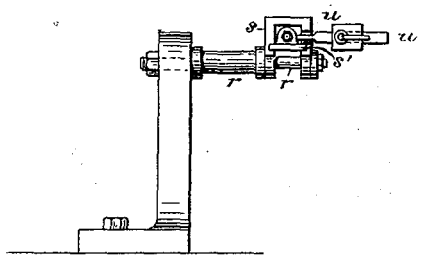


Fig. 7.



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MACHINE FOR GRINDING ELLIPTICAL GLASSES, MIRRORS, AND THE LIKE.

SPECIFICATION forming part of Letters Patent No. 276,084, dated April 17, 1883.

Application filed February 2, 1883. (No model.)

To all whom it may concern:

Be it known that I, GEORG SCHWARZ, a subject of the Emperor of Germany, residing at Fürth, in the Kingdom of Bavaria, in the German Empire, have invented certain Improvements in Machines for Grinding Elliptical Glasses, Mirrors, and the like, of which the following is a specification.

My invention relates to certain improvements on the well-known lathes for turning elliptical forms, whereby I am enabled to apply the same to the grinding of the edges of elliptical glasses, especially mirrors.

My improvements are adapted to grinding both the peripheries of the glasses and the bevels on their edges, where such bevels are employed.

The principal novel features of my invention relate, first, to the peculiar mechanism employed for holding the glass up to the face-plate of the machine while it is being ground. As the glass moves elliptically, it is necessary that the elastic pad which holds it in place shall also move correspondingly, and this is accomplished by the mechanism referred to; and, second, to means for keeping the glass pressed elastically up to the grinding-wheel and for drawing it back out of contact with said wheel.

In the drawings which serve to illustrate my invention, Figure 1 is a plan of the entire machine. Fig. 2 is a front elevation of the grinding-wheel and its operative mechanism and frame. Fig. 3 is a side elevation of the lathe alone, partly in section on line 3 3 in Fig. 1. Fig. 4 is a rear elevation of the lathe. Fig. 5 is a sectional front elevation of the lathe, taken on line 5 5 in Figs. 1 and 3. Fig. 6 is a sectional front elevation of the lathe, taken on line 6 6 in Fig. 1; and Fig. 7 is a side elevation of a device for holding the glass up to the face-plate, which is cut off in Fig. 3.

I will first describe the lathe, which is the same as the well-known lathe for turning oval forms.

a represents a substantial frame, in which is rotatively mounted the shaft *b*, which is driven through the medium of a pulley, *c*, by a belt, which is not shown. On the end of frame *a* is mounted an eccentric, *d*, which is slotted where it embraces the shaft *a*, so that its "throw" may be increased or diminished by shifting it laterally on the frame *a*. The slot in the eccentric is shown by dotted lines in Fig. 5. The base *d'* of the eccentric *d* is secured adjustably to the frame by bolts, as indicated in Fig. 3. On the end of shaft *b*, beyond the eccentric, is fixed a disk, *e*, provided with slots *ff*, (see Fig. 5,) and with keepers or guides, in which plays a slide-plate, *h*, and into this plate are fixed four bolts or studs, *g g*, which pass back through slots *f*. The rear ends of these bolts are connected, two and two, as shown, by bearing-blocks *i*, which rest on and embrace the fixed or non-rotative eccentric *d*. To the center of the slide-plate *h* is fixed a stud or spindle, *k*, which bears the elliptical face-plate *l*, which bears the glass to be ground or other thing to be operated on.

The operation of the lathe is as follows: The amount of ellipticity is regulated by the adjustment of the center of the eccentric from the axis of shaft *b*. When this has been settled upon and the eccentric properly adjusted, rotation of the shaft *b* will impart to a point on the face-plate *l* an elliptical motion, the degree of ellipticity depending upon the eccentricity of the eccentric *d*. This is effected through the medium of the movement of the slide-plate *h* across the face of the rotating disk *e*, caused by the blocks *i* engaging the eccentric *d* as they are borne around it.

What I have above described is in substance the well-known lathe for turning elliptical forms, and this I make no claim to. I will now describe my improvements whereby I utilize said lathe in the grinding of elliptical glasses.

Referring first to Figs. 1 and 2, I will describe the grinding-wheel and its operative mechanism.

a' is the grinding-wheel, which may be of any kind suited to the purpose, and *b'* is the shaft or arbor of the grinding-wheel, which is rotatively mounted in a suitable frame, *c'*, and provided with suitable driving-pulleys, *d''*.

In order to adjust the wheel to the glass to be ground, so as to give it a bevel, if necessary, the base of the frame has slots *q'*, through which pass securing-bolts *r'*, as in Fig. 2. These possess no novel features, and any known mode of slotting may be employed.

In order to impart to the grinding-wheel a reciprocating movement axially, in order to insure the even wearing of the periphery of the wheel, I pivot a lever, g', to the frame at h', and arrange its upper end to take between two collars, i, on the shaft b', while its lower end engages a spiral endless cam-groove, e', in the boss of a wheel, f', mounted on a stud in the lower part of the frame. The wheel f' is driven from a pulley, k', on the shaft b' by means of a belt, as shown. The relative proportions of the wheels f' and k' govern the speed with which the shaft and grinding-wheel reciprocate. When the shaft b' is rotated, rotary motion is communicated to wheel f', and the groove e' in the boss of this wheel imparts a reciprocating motion to the lever g', whereby it is caused to reciprocate shaft b' through the engagement of the end of said lever with the collars on the shaft.

In order to provide a good bearing for the glass to be ground, I provide the face-plate l with a facing of rubber, felt, or other elastic material, and to prevent the glass from slipping on the face-plate while it is being ground I provide the same with a slight raised rim or border.

To keep the glass pressed up to the face of the face-plate, I employ the device which I will now describe with reference particularly to Figs. 1, 6, and 7.

r is a stud or shaft mounted on the frame a, and s is a slide-box mounted on said stud between collars, so that it is free to rock or oscillate on said stud. This box has grooves or keepers in its sides, (interiorly,) in which is mounted a slide, s', (see Fig. 6,) which is free to slide or reciprocate in the box. This slide is rigidly attached to a rod, t, which is rigidly connected at its other end to a strap, n, which embraces a boss on the back of the face-plate l, in the manner of an eccentric and its strap, said strap being, however, concentric with the shaft k, as indicated in dotted lines in Fig. 6. Thus the motion of the shaft k imparts a reciprocating movement to the slide s' and an oscillating movement to the box s. To the slide s', I rigidly secure a bar, u, and on this bar mount adjustably but rigidly a spring-bar, p. The spring-bar has a socket at its butt, which is arranged to slip onto the bar u, where it is adjustably secured by a set-screw, as shown. In the free end of the spring-bar p is a pin, q, which loosely engages a socket or recess in the back of a pad, o, that presses against the glass mounted on the face-plate l, and holds it firmly but elastically up thereto. This pad o has a soft material on its face where it is in contact with the glass, and it moves with the glass through the elliptical movements of the latter by reason of the attachment of the spring p to the slide s'—that is to say, the spring p, bar u, slide s', rod t, and strap n form a frame practically rigid as between its parts, and the end of spring p to which the pad o is attached is thus compelled to follow the elliptical movements of the strap n. The pad o may be attached to the spring, if desired. The tension of the spring may be adjusted by sliding it in or out on the bar u.

It will be seen that while the spring or spring-bar p keeps the pad o always pressed up to the glass the pad is free to rotate with the glass and to follow all its motions, and neither the pad nor the spring-bar is in the way of the grinding-wheel. The parts t, s', u, and p virtually constitute an adjustable two-armed frame, of which the bars t and p are the two arms, and which is so hung by means of the slide-box s that it follows in its movements the elliptical path of the axis of the face-plate.

In order to keep the glass pressed elastically up to the grinding-wheel, and at the same time to permit it to be withdrawn at any time for its removal from the face-plate, I provide the means I will now describe with reference to Fig. 1.

In a bracket, m', fixed to the rear of the frame a, I mount a three-armed lever, l', one end of which has a fork that engages a circumferential groove in the shaft b, while the other arm serves as an operating-handle. The third arm, n', which stands out at about a right angle to the lever, is connected by a spring, o', with a fixed part or post, p'. The spring o' tends to move the shaft b endwise in a manner to press the glass mounted on the face-plate up to the grinding-wheel; but to prevent an excess of movement in that direction I fix a collar, t', on the shaft b, which contacts with the frame a, and thus limits its movement.

When it is desired to withdraw the face-plate l, so as to remove the glass, this may be done by means of the lever l', in a manner that will be well understood without the necessity of further description.

To avoid obscuring the parts shown, I have omitted from Fig. 1 the parts f' and g', which are clearly shown in Fig. 2.

The center of the pad o should coincide with the center of the face-plate, in order that both of these parts shall move properly together.

Having thus described my invention, I claim—

1. In a machine for grinding elliptical glasses and the like, the combination, with the face-plate and the elliptical lathe for imparting to it an elliptical motion, of an oscillating slide-box arranged on an axis parallel with the axis of rotation of the lathe, a sliding two-armed frame adapted to slide in said box, one arm thereof connected to a boss on the rear of the face-plate, whereby the frame is oscillated with said box and is slid back and forth in the latter, and the other arm extending to the front of the face-plate and adapted to press the glass or other article to be ground against the same, substantially as and for the purposes set forth.

2. The combination, with the elliptical lathe and its face-plate l, of the oscillating slide-box

s and a two-armed frame consisting of a slide, *s'*, arranged to slide in said box, a strap-rod, *t*, forming one arm of said frame and engaging a boss on the rear of the face-plate, a bar, *u*, connected to said slide, and a bar, *p*, forming the other arm of said frame, attached to and adjustable along said bar *u*, extending in front of the face-plate, and adapted to press the glass or other article against the same, substantially as set forth.

3. In a machine for grinding elliptical glasses and the like, the combination, with the lathe, provided with the face-plate, adapted to receive the glass to be ground, of the box *s*, mounted to oscillate, as shown, the slide *s'*, arranged to slide in said box, the strap-rod *t*, provided with a strap to encircle the boss of the face-plate, and connected to the slide *s'*, the bar *u*, attached to said slide, the spring-bar *p*, and the pad *o*, all arranged to operate substantially as set forth.

4. In a machine for grinding elliptical glasses and the like, the elliptical lathe provided with a main shaft, *b*, capable of an endwise as well as a rotary movement, in combination with the lever *l'*, one arm of which is arranged to engage a groove in said shaft *b*, and said lever being provided with an arm, *n'*, the spring *o'*, and the fixed part or post *p'*, all arranged to operate substantially as set forth.

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ARTHUR BAERMANN.