M. Witmer,

Grinding Lenses.

No. 40,303. Patented Oct. 13, 1863.

Fig. 1.

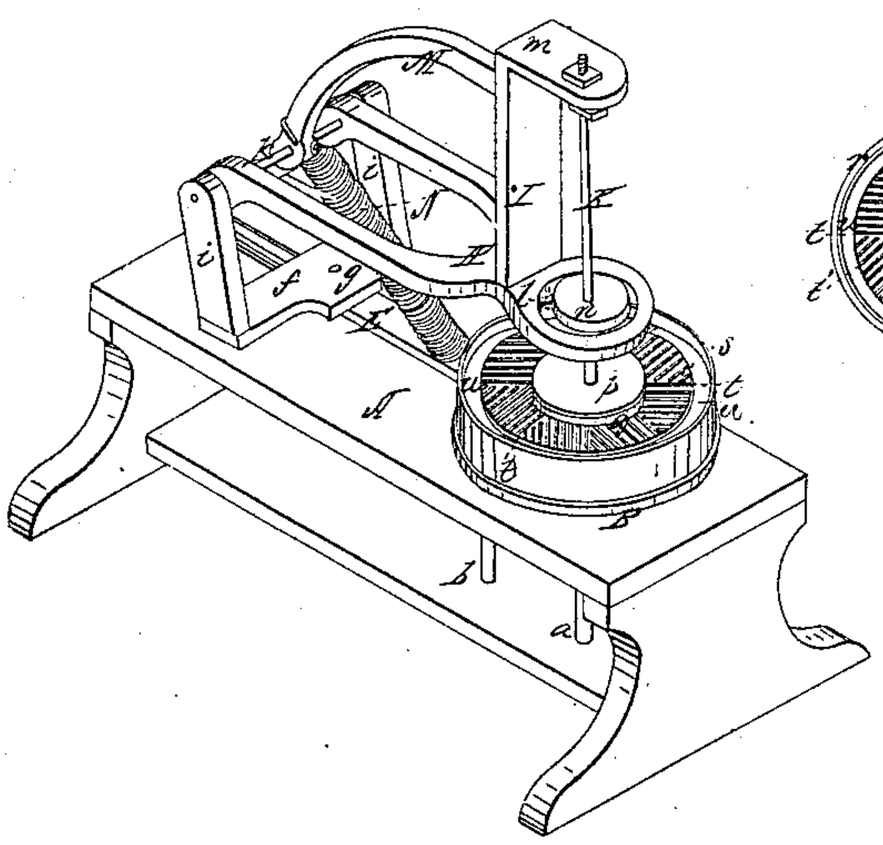


Fig. 4.

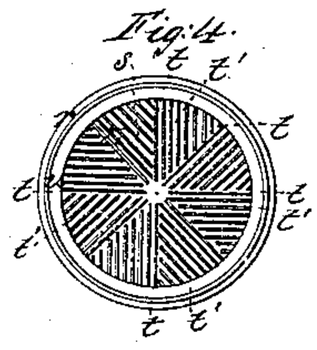


Fig. 2.

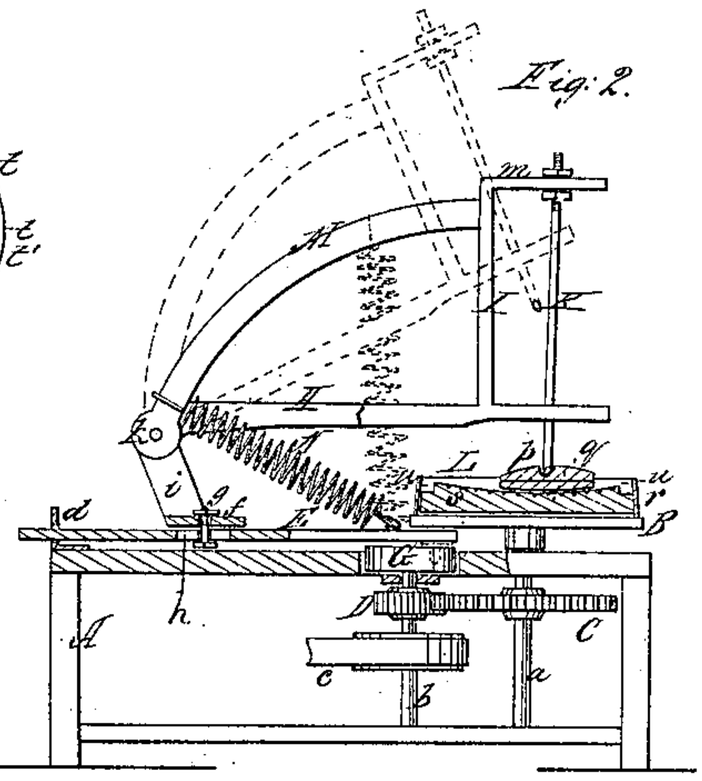
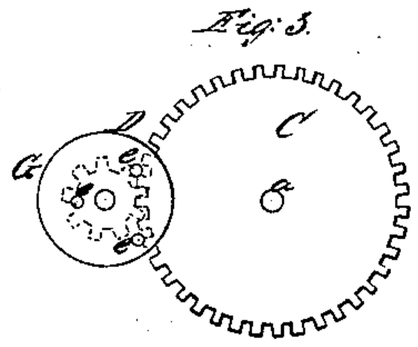


Fig. 3.



Witnesses:

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UNITED STATES PATENT OFFICE.

MANUEL WITMER, OF SOUTH PEKIN, NEW YORK.

MACHINE FOR GRINDING AND POLISHING LENSES.

Specification forming part of Letters Patent No. **40,303**, dated October 13, 1863.

To all whom it may concern:

Be it known that I, MANUEL WITMER, of South Pekin, in the county of Niagara and State of New York, have invented certain new and useful Improvements in Apparatus for Grinding and Polishing Lenses; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this specification.

Figure 1 is a perspective view of my improved machine; Fig. 2, a side elevation thereof, a portion being shown in section; Fig. 3, a plan of the gearing and crank-plate detached; Fig. 4, a plan of the basin detached.

Like letters of reference indicate corresponding parts in all the figures.

It is my object to produce a machine by which lenses may be ground and polished automatically, and without the manipulation necessary in the usual process.

A suitable frame, A, is provided, in one end of which is mounted a vertical shaft, *a*, having secured to its upper end a disk or equivalent support, B. This shaft receives motion preferably by means of a spur-wheel, C, secured to it, which wheel engages with a similar pinion, D, on a vertical driving-shaft, *b*, that is actuated by means of a band running on a pinion, *c*, or in any desirable manner.

On top of the main frame is situated a sliding carriage, E, the forward end of which forms a crank-connection with the driving-shaft *b* by means of a wrist (shown in dotted lines, Fig. 2) and crank-plate G on the end of the latter shaft, said wrist connecting with holes *e e* of the crank-plate. These holes are at varying distances from the center of the plate, so that by adjusting from one to the other a greater or less length of stroke may be obtained, as desired. The rear end of the carriage rests in a guide, *d*, Fig. 2, which allows a free longitudinal movement.

At a suitable position in the rear the carriage is provided with a cross-piece, *f*, secured thereto by means of a bolt, *g*, passing through a longitudinal slot, *h*, in the carriage, and this cross-piece in turn has uprights *i i* respectively at opposite ends, which form bearings for an axis, *k*, to which is jointed a light frame, H, branched in the rear, but converging in front and forming a circular opening, *l*, as clearly represented in Fig. 1. A standard, I, extends upward in the rear of this opening, and this has a right-angled arm, *m*, which sustains in any suitable manner a shaft, K, extending downward through the opening, and having rigidly secured to it at that point a friction-wheel, *n*, fitting within the opening and resting against its side.

If desirable, the sides inclosing the opening and also the friction-wheel may be cut with cogs, the one part gearing into the other, but the same effect is produced by the friction of the two smooth surfaces, the design being to give the shaft a revolving motion as it is operated, as will presently be described.

The lower end of the shaft K is made pointed, of triangular or other equivalent shape, and fits loosely in a correspondingly-shaped hole or socket of a cover, P′, which holds the lens *q* in place while it is being ground and polished.

The lens rests upon a basin, L, which in turn is supported by the disk B, already described. This basin consists of two parts, a rim or band, *r*, of conical shape and considerable width, and an interior bed, *s*, which fits closely within the rim. The bed may be either concave, as represented in the drawings, convex, or plane, as may be desirable, to grind the lens of proper shape. The bed proper is grooved, as represented in Figs. 1 and 4, being divided into sections by radial grooves *t t*, and the respective intermediate sections filled by grooves *t′ t′*, parallel with the leading radial groove. Thus, the intermediate parallel grooves of one section are angular to those of the next section. The bed is also provided on the outer edge with a channel or depression, *u*, extending the whole distance around.

For producing the necessary pressure of the lens upon the bed in grinding and polishing, a bow, M, is secured to the standard I, curving backward, and jointed at the opposite end to the axis *k*. A coiled spring, N, or equivalent, is attached at one end to the carriage E, and at the opposite end to the bow, in such a manner that it may be adjusted up and down to produce a greater or less degree of pressure. Thus arranged there are several motions produced in grinding the lens: First, the revolution of the basin itself by means of the shaft on which it rests; second, the forward and backward reciprocation of the lens produced by the carriage and frame H; third,

the lateral play produced by the crank-plate G, and, fourth, the independent revolution of the lens, by means of the friction-wheel *n*. This last action is produced by the friction-wheel engaging with the sides of the opening *l* during the reciprocations and the lateral movement of the carriage. By this variety of motion a more equal friction on the surface of the lens is produced, and consequently it is ground better than usual. In order that the lens shall not pass over the same path on the bed at every revolution, and consequently wear the surface of the bed unequally, I prefer to make the number of teeth on the spur-wheel C and pinion D about in the proportion of $4\frac{4}{9}$ to 1, which is the ratio shown in the drawings. This proportion, however, may be varied slightly, so that the fraction may be either greater or less than one-half, but the even fraction is to be avoided. By this arrangement a new path of the lens is produced for a great number of revolutions, thus wearing the surface of the bed equally and preserving the proper shape of the lens itself.

The arrangement of the grooves *t' t'* is such as to retain the emery best, especially where the bed is concave, for in its passage over the bed the lens has a tendency to work the emery outward in the angular grooves *t*, thus opposing its gravitation, which would not be the case if they were all radial, the action of the emery in that condition being to run to the center. The situation of the grooves is also such as to produce the best effect in grinding, as they present a better surface to the lens. By means of the rim *r* and channel *u* a sufficient amount of water is retained in the basin at all times for keeping the emery wet, thus saving the necessity of applying water continually, as would otherwise be the case. The conical shape of the rim allows the bed to be inserted water-tight or removed at pleasure for cleaning. This is of consequence, for in polishing after the grinding is accomplished it is necessary to employ the same basin in order to preserve the perfect form of the lens, and in polishing the emery must be all removed and rotton stone used in its place. In polishing, also, a greater degree of pressure is required than in grinding, and this is produced by simply turning the coiled spring N up as indicated by red lines in Fig. 2. By this arrangement of the spring the pressure may be varied to any degree desired, while the action of the carriage is not interfered with in the least.

The frame H, together with the shaft K, can be turned back on the axis *k*, as indicated by red lines in Fig. 2, for inserting the lens on the bed or removing it. By adjusting the crank-connection of the carriage from one to another of the holes *e e* in the crank plate a greater or less length of stroke of the carriage is produced, and consequently a larger or smaller lens may be ground. The slot *h* in the carriage allows the cross-piece *f* to adjust itself to any change in the crank-connection.

By this arrangement I produce lenses in a greater degree free from spherical aberation.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. Grinding and polishing the lens upon the basin L when the basin has a turning motion and the lens has an independent revolving motion of its own, and a vibrating, longitudinal, and lateral motion, produced by the reciprocation of the carriage in such a manner that said lens travels in a new path over the surface of the basin at each revolution, substantially as herein set forth.

2. In combination with the outer channel, *u*, the rim *r*, arranged substantially as and for the purpose herein specified.

3. The combination and arrangement of the jointed frame H, bow M, carriage E, and adjusting-spring N substantially as herein set forth.

4. The special arrangement and construction of the whole machine substantially as described.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

MANUEL WITMER.

Witnesses:
BENDICKT MAURER,
SAMUEL WITMER.