C. E. QUIMBY.

LENS POLISHING MACHINE.

APPLICATION FILED JAN. 4, 1907.

940,988. Patented Nov. 23, 1909.

Fig. 1.

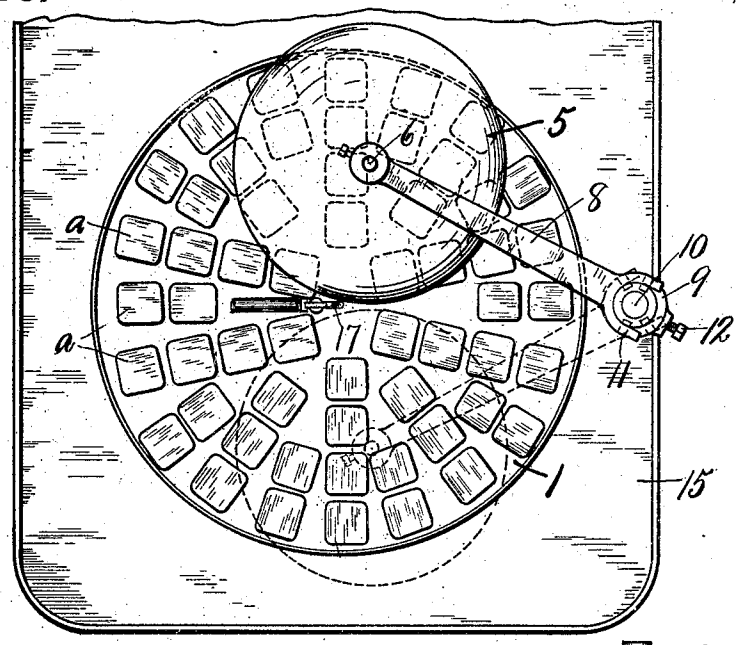
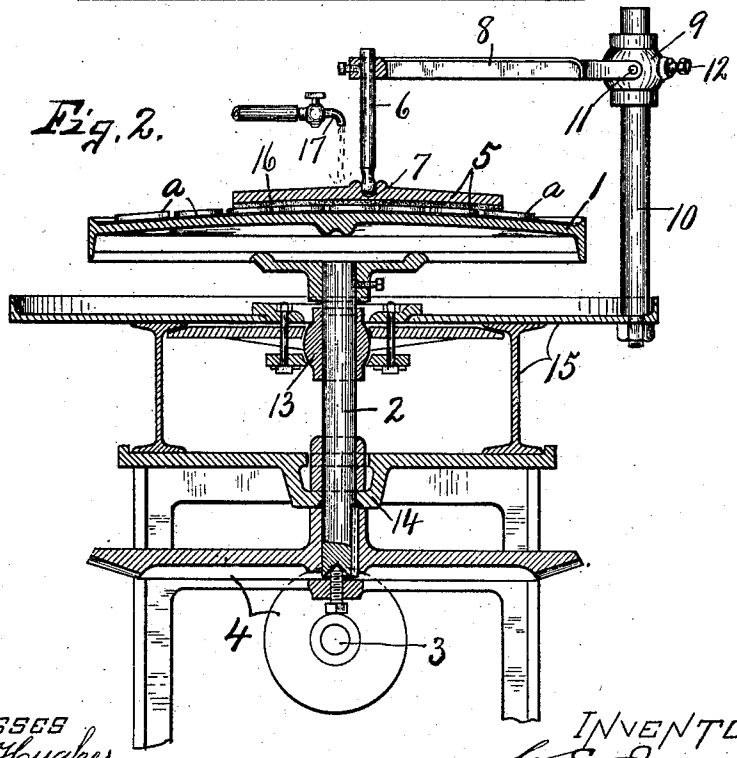


Fig. 2.



WITNESSES
Chas. H. Hughes
K. E. Chace

INVENTOR
C. E. Quimby
BY
Howard P. Denison
ATTORNEY

NORRIS PETERS, INC., LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

CLARENCE E. QUIMBY, OF GENEVA, NEW YORK, ASSIGNOR TO THE STANDARD OPTICAL COMPANY, OF GENEVA, NEW YORK, A CORPORATION OF NEW YORK.

LENS-POLISHING MACHINE.

940,988. Specification of Letters Patent. Patented Nov. 23, 1909.

Application filed January 4, 1907. Serial No. 350,781.

To all whom it may concern:

Be it known that I, CLARENCE E. QUIMBY, of Geneva, in the county of Ontario, in the State of New York, have invented new and useful Improvements in Lens-Polishing Machines, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to certain improvements in lens-polishing machines, and refers more particularly to machines for grinding or polishing plain or spherical surfaces in which a multiplicity of lenses are mounted upon a single rotary form and are engaged by a separately movable disk having a grinding surface conforming to the surface of the bed upon which the lenses are adhesively secured.

The essential object of my invention is to revolve the block or form upon which a multiplicity of lenses are adhesively mounted, and to support upon the surfaces of such lenses, a grinder or polisher having a diameter much smaller than the block or form, and to adjust said polisher in such manner that one of its edges is substantially coincident with the center, while the other edge protrudes some distance beyond the periphery of the block or form.

A further object is to support the polishing disk in such manner as to permit it to revolve freely about its center by reason of its contact with the moving lenses on the rotary block or form.

Other objects and uses will be brought out in the following description.

In the drawings—Figure 1 is a top plan of a lens polishing machine embodying the various features of my invention. Fig. 2 is a transverse vertical sectional view through the center of the same machine.

In order to demonstrate the practicability of this invention, I have shown a rotary form or bed —1— as disposed in a substantially horizontal position and secured to the upper end of a rotary shaft —2— which may be driven from any available source of power, as a shaft —3—, through the medium of intermeshing gears —4—, best seen in Fig. 2.

The upper surface of the form or bed —1— is made to conform to the finished surface of the lens which it is desired to produce and is usually provided with a coating of adhesive, commonly used in such instances, and by which the blank lenses are firmly held upon the upper face of the form during the rotation of the latter.

A circular polishing disk —5— is supported above and upon the upper faces of the lenses —*a*— at one side of the axis of revolution of the form —1—, said polishing disk being of much less diameter than that of the form —1— and is usually held eccentrically to said form by a vertical spindle —6— having a spherical lower end seated in a socket —7— in the upper face of the polishing disk, whereby a ball and socket joint is provided. The upper end of the spindle —6— being adjustably secured by a set screw to a horizontal laterally adjustable arm —8— which, in turn, is secured to a hub —9— upon a vertical spindle —10— at one side of the rotary form —1—.

The lower end of the spindle —6— is loosely seated in the socket —7— and forms a bearing upon which the polishing disk —5— may rotate freely, said rotation being effected by contact of the polishing surface of the disk —5— with the upper faces of the lenses during the rotation of the lens supporting-bed or form —1— upon which the lenses are adhesively secured.

As best seen in Fig. 1, the diameter of the polishing disk —5— is slightly greater than the radius of the lens supporting bed or form —1—, and in operation, the arm or bracket —8— is adjusted so as to hold the polishing disk —5— with one side of its periphery in close proximity to the axis of the lens supporting form —1— so that the diametrically opposite side of the disk will, therefore, project some distance beyond the periphery of said form to allow any foreign matter which may adhere to the polishing surface to precipitate or fall beyond the periphery of the lens supporting form. This bracket —8— is preferably pivoted at its outer end at —11— to the sleeve —9—, the latter being adjustable vertically along the standard —10— and is held in its adjusted position by a set screw —12—, the inner end of the bracket —8— which carries the spindle —6— is therefore rockable or adjustable vertically upon its pivot —11— to disengage the lower end of the spindle —6— from the socket —7—, thereby permitting the removal of the polishing disk —5— whenever desirable. The upright shaft —2— to which the lens supporting form

—1— is secured is journaled in suitable bearings 13— and 14— upon the main supporting frame, as —15—, which also carries the upright standard —10—. The bracket or rock-arm —8— and its supporting sleeve —9— are also adapted to be rocked laterally upon the axis of the supporting spindle —10—, thereby correspondingly shifting the spindle —6— and causing the polishing disk —5— to traverse across the face of the lens supporting form —1— whenever this action may be desired, and in fact, in some instances, I may prefer to move the polishing disk —5— back and forth across the face of the lens supporting form automatically so as to afford a more uniform grinding or polishing of the lenses and wearing of the polishing surface, which is usually provided with a layer —16— of thick felt or equivalent material adapted to retain a certain amount of polishing substance, the latter being usually placed between the polishing surface and surfaces of the lenses, and in most instances, is usually applied with a brush or other means directly to the upper surfaces of the lenses, and is then drawn or spread evenly over the lenses by the rotary action of the lens supporting form and polishing disk.

Although the lateral swinging action of the arm or bracket —8 permits the polishing disk to traverse the face of the lens-supporting disk, said arm or bracket is preferably held by the set screw —12— in one position to support the polishing disk eccentrically with reference to the lens supporting form with the one side or edge of the polishing disk at or near the axis of the lens-form —1— and its diametrically opposite edge extending some distance beyond the periphery of said form. This relative arrangement and comparatively smaller size of the polishing disk exposes the major portion, in this instance, practically two-thirds of the entire upper surface of the lens supporting form, thereby exposing the major portion of the lenses while comparatively few of the lenses are covered by the polishing disk, and this, only for a brief interval of time, which permits the lens-form to be revolved at a comparatively high speed without liability of overheating the lenses, or softening the adhesive by which they are held upon the surface of the form by reason of the fact that the major portion of the lenses are exposed to the cooling influence of the air, which cooling influence may be further augmented by the distribution of a small quantity of cooled water which is allowed to drip through a suitable supply nozzle —17— upon or near the center of the lens-supporting form, from which point it is carried by centrifugal force or gravity from the center downwardly to the periphery of said form between and across the surface of the lenses, thereby removing any foreign matter which might be drawn upon the surface of the lenses by the polishing disk.

It is obvious that the high speed at which the lens supporting block or form may be revolved will operate to throw off whatever foreign matter may accumulate between or upon the lenses, thus keeping the surface of the block clean and also preventing damage to the lenses from such foreign matter. It is also clear that by reason of the fact that the major portion of the surface of the block is exposed to the air, and that part of the polishing disk which projects beyond the periphery of the block is also exposed, and that the air or other cooling agent which is introduced upon the exposed lenses and surface of the block, said block may revolve at a high rate of speed, and the polishing disk may also be weighted far beyond what would be practicable under the system of polishing now in general use.

By my improved method of polishing, the time required to bring the lenses to the desired state of perfection, is materially reduced, and at the same time I am enabled to secure a far greater percentage of perfect lenses than is possible in the use of fixed or stationary forms.

In operation, the lenses to be ground or polished are adhesively secured to the surface of the form —1—, after which, the polishing disk —5— having its polishing surface conforming to the adjacent face of the lens supporting form, is placed upon the upper surface of a portion of the lenses at one side of the axis of rotation of said form with one side slightly overhanging or projecting slightly beyond the periphery of the form —1—, where it is held in such position by the bracket —8— and spindle —6—, and is free to revolve around the lower end of said spindle.

After the polishing disk —5— is properly placed the lens-supporting form —1— with its lenses firmly adhering thereto, is rotated at a comparatively high rate of speed through the medium of the driving shaft —3— and intermeshing gears —4—, the driving shaft being adapted to be connected to any available source of power not necessary to herein illustrate or describe.

During the grinding or polishing operation, the polishing disk —5— is caused to rotate at a greater or less speed by reason of its contact with the moving lenses, and owing to the fact that the greater portion of the lenses are exposed to the air or other cooling agent, the heat developed by friction between the contacting surfaces of the lenses and polishing disk is kept at a sufficiently low temperature to prevent softening of the adhesive or loosening of the lenses, at the same time, any foreign matter which

may accumulate upon the surface of the lens supporting form, or between the lenses, is expelled by centrifugal force which may be further augmented by introducing a small quantity of water or other cleansing liquid upon the surface of the block or form during its rotation, it being apparent that any liquid which might be employed for this purpose will be instantly thrown by centrifugal force from the center to the periphery of the form, thereby following the channels or interstices between the lenses, and thoroughly cleansing the lens-supporting form from any foreign matter which might scratch or otherwise injure the lenses by being drawn thereon by the polishing disk.

What I claim is:

1. A lens polishing machine comprising a rotary form adapted to support a multiplicity of lenses, an adjustable arm overhanging the upper face of the form, a spindle carried by said arm and having a spherical lower end, and a rotary polishing disk having its upper face provided with a socket for the reception of said spherical end of the spindle whereby a ball and socket joint is provided between the spindle and the disk, said disk having its lower face in contact with the lenses on the form and rotated by said contact, said disk of greater diameter than the radius of the form.

2. A lens polishing machine comprising a rotary form adapted to support a multiplicity of lenses, an arm overhanging the upper face of the form, a spindle adjustably connected to said arm and having a spherical lower end and a rotary polishing disk having a socket in its upper face for the reception of said spherical end of the spindle whereby a ball and socket joint is provided between the spindle and the disk, said disk having its lower face in contact with said lenses and rotatable by said contact.

3. A lens polishing machine comprising a rotary form adapted to support a multiplicity of lenses, an arm overhanging the upper face of the form, a support for the arm, and a spindle carried by the arm and having a spherical lower end, and a rotary polishing disk having a socket in its upper face for the reception of said spherical end whereby a ball and socket connection is provided between the disk and the spindle, said disk having its lower face in contact with the lenses on the form and rotated by said contact.

4. A lens polishing machine comprising a rotary form adapted to support a multiplicity of lenses, the upper surface of said form conforming to the finished surface of the lenses which it is desired to produce, means for securing the lenses of the form, an adjustable arm overhanging the upper face of the form, a spindle carried by said arm, a rotary polishing disk having a central bearing, and loose connections between the lower end of the spindle and center of the disk whereby said disk is revoluble relatively to and separable from the spindle, said disk being of greater diameter than the radius of the form and having its lower face in contact with the lenses on the form and rotated by such contact.

In witness whereof I have hereunto set my hand this 31st day of December 1906.

CLARENCE E. QUIMBY.

Witnesses:
ELIZABETH PRENDERGAST,
C. B. ROGERS.