L. W. BUGBEE.

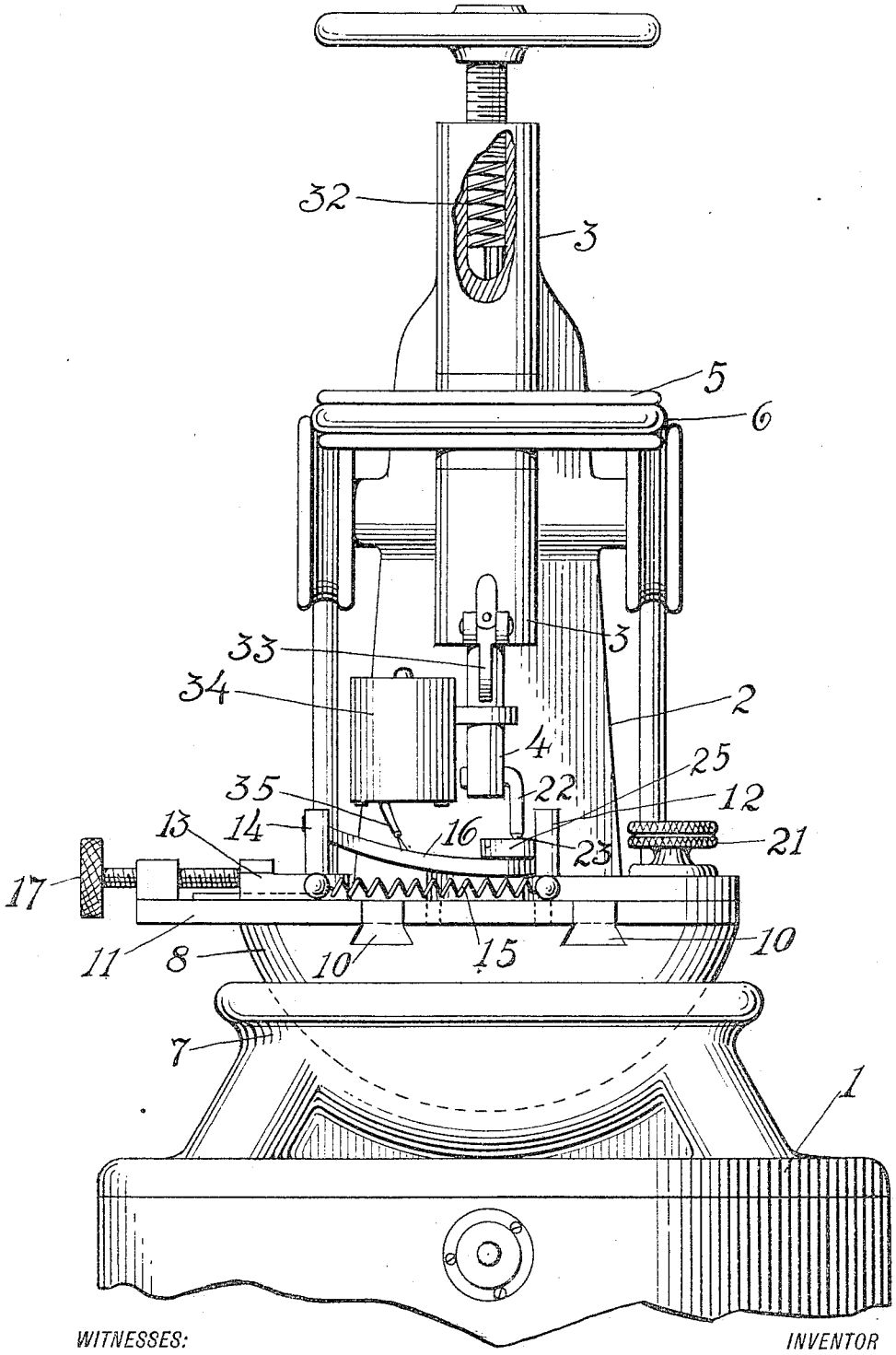
GRINDING MACHINE.

APPLICATION FILED AUG. 21, 1916.

1,282,037.

Patented Oct. 22, 1918.

2 SHEETS—SHEET 1.



WITNESSES:

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Fig. 1

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2 SHEETS—SHEET 2.

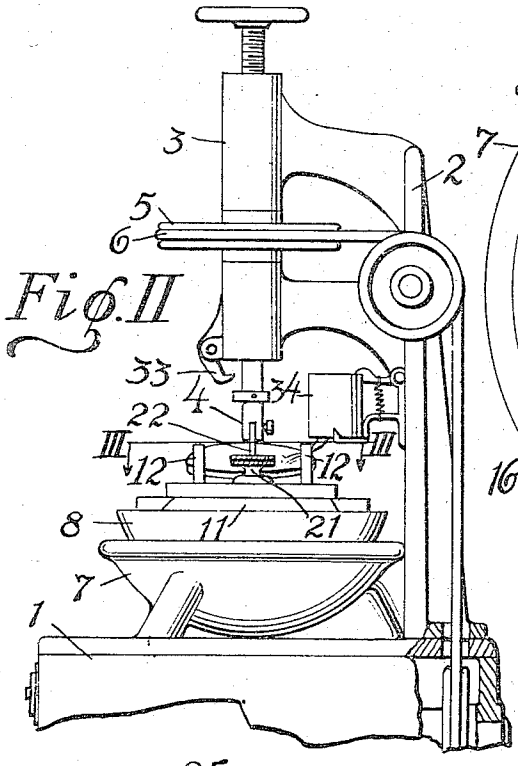


Fig. II

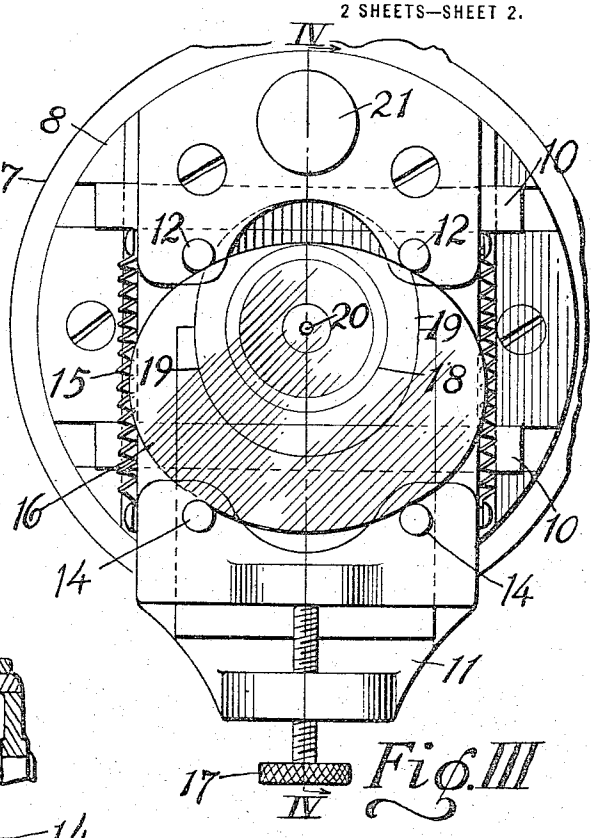


Fig. III

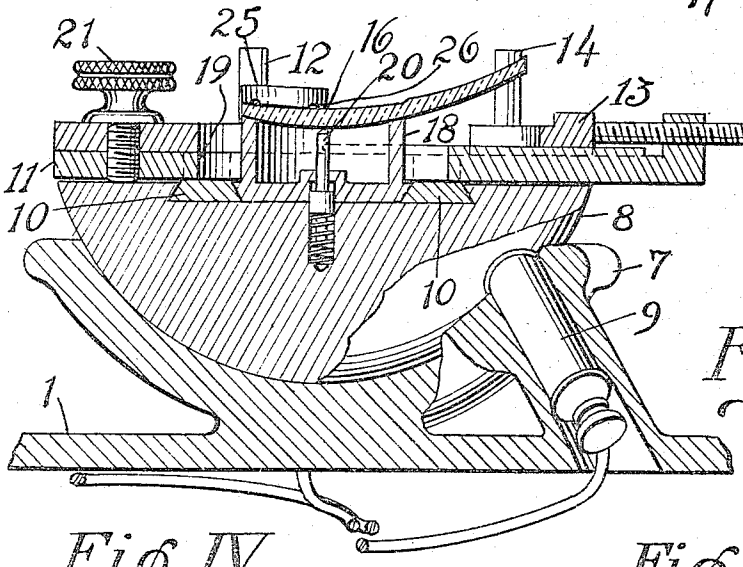


Fig. IV

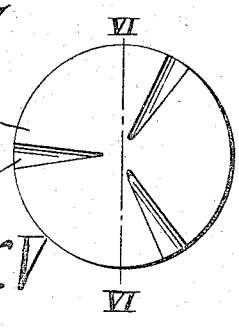


Fig. V

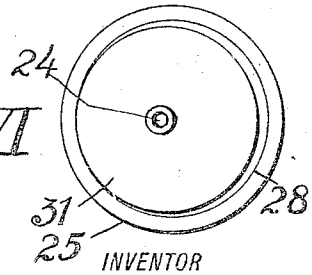


Fig. VI

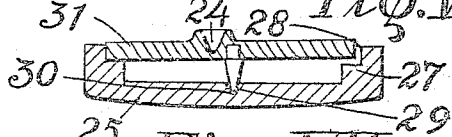


Fig. VII

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UNITED STATES PATENT OFFICE.

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GRINDING-MACHINE.

1,282,037. Specification of Letters Patent. Patented Oct. 22, 1918.

Application filed August 21, 1916. Serial No. 116,038.

To all whom it may concern:

Be it known that I, LUCIAN W. BUGBEE, a citizen of the United States, residing at Southbridge, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Grinding-Machines, of which the following is a specification.

My invention relates to improvements in grinding machines and has particular reference to a novel and improved machine particularly adapted for use in the construction of bifocal lenses.

One of the leading objects of the present invention is the provision of a novel and improved means for readily and accurately forming the minor or reading portion of a lens having a plurality of focal points.

A further object of the invention is the provision of an improved machine particularly adapted to hold and accurately position therein a finished lens or lens blank and facilitate the formation of a portion thereof to a different curvature to change the lens from an ordinary single focus lens to a bifocal.

A further object of my invention is the provision of an improved machine which may be readily adjusted to insure exact centering or positioning of the centers of the two foci of the lens relative to each other and to facilitate the formation of the second curve with a prism or other variation from the power and curve of the major blank as desired.

Another object of my invention is the provision of a novel and improved tool for operation upon the lens and a novel and improved means for insuring a gradual turning movement of the tool to prevent scratching of the lens or formation of wavy surfaces thereon.

Other objects and advantages of my improved grinder should be readily apparent by reference to the following specification taken in connection with the accompanying drawings forming a part thereof, and it will be understood that I may make any modifications in the specific details of construction shown and described without departing from or exceeding the spirit of the invention.

Figure I represents a front elevation of the grinding machine constructed in accordance with and embodying the generic principles of my invention.

Fig. II represents a side elevation thereof.

Fig. III represents a plan view of the lens supporting table and associated parts, the remainder of the machine being shown in section as on the line III—III of Fig. II.

Fig. IV represents a sectional view as on the line IV—IV of Fig. III.

Fig. V represents a bottom plan view of one of the grinding or polishing tools for use in connection with my improved machine.

Fig. VI represents a top plan view of one form of tool.

Fig. VII represents a sectional view as on the line VI—VI of Fig. V.

In the drawings, in which similar characters of reference are employed to denote corresponding parts throughout the several views, the numeral 1 designates the base of my improved machine having rising therefrom the standard 2 provided with the bearings 3 for the lens grinding spindle 4 which is suitably provided with driving means, as the pulley 5, adapted to receive a driving belt 6 for rotating the spindle.

Disposed beneath the spindle and concentrically located with respect to the axis of the spindle is the bearing cup 7 preferably of substantially hemispherical form, adapted to receive the hemispherical supporting member or bed 8, which is mounted for rolling movement in the cup 7, any suitable means being employed to lock the bed in desired adjusted relation to the cup, as for example the magnetic clutch or locking members 9 shown in Fig. IV of the drawings, it being understood, however, that any desired equivalent of these members may be employed, and it being further understood that the essential feature in the mounting of the bed is that it shall be mounted for substantially universal movement, a hemispherical bed and cup having been here illustrated on account of the ease of locking said parts in adjusted position, but it will be understood that other equivalents such as a double gimbal bearing or the like may be employed if preferred.

Fitting into dove-tail slots on the upper face of the bed 8 are the slides 10 mounted for movement transversely of the bed, while

supported by the slides 10 and mounted for movement transversely with the slides and for movement across the slides is the lens holder carriage plate 11 having projecting upward therefrom the pair of stationary lens positioning rests 12 and having mounted thereon the supplemental slide 13 bearing the additional lens engaging members 14, springs 15 urging the slide toward the stationary pins 12 to resiliently clamp the lens 16 therebetween, a suitable locking mechanism such as the set screw 17 serving to lock the slide 13 in clamped position and thus securely retaining the lens when properly positioned and centered, and preventing any movement thereof relative to the bed.

It is to be understood in connection with the following description that I have shown and described a semi-finished or cut lens as being mounted within the holder and have particularly described a lens holder adapted to receive this type of lens, although the holder may likewise be employed in connection with uncut lenses if desired, or the holder may be varied to any other suitable or equivalent form which will satisfactorily engage the lens and retain it in desired position.

To support the central portion of the lens substantially at the point to be ground, I secure on the bed 8 a lens support 18, preferably in the form of an annulus, this lens support projecting upward through the aperture 19 in the lens carriage plate 11 for engagement with the lens, an annulus or cylindrical member being preferably employed in that it will fit a spherical surface of any curve and consequently satisfactorily support the lens, although it will be understood that this support 18 is preferably removably mounted upon the base 8 so that varying shapes may be substituted according to the particular curve of the under face of the lens to be ground. The annulus is preferably provided with a central point 20, which may be suitably yieldingly or resiliently mounted, this point serving both to partially support the center of the lens and more particularly aiding in determining the exact point on the original lens blank at which the center of the minor portion or segment will lie, the point 20 being disposed in axial alinement with the grinding spindle 4 when the several parts are in normal position.

In the grinding of a bifocal segment on the lens it is therefore merely necessary to release the locking member 17 and the locking device 21 for the carriage plate 11, to then separate the points 12 and 14 until the lens may be placed therebetween, the lens being pressed downward to firmly rest upon the annulus or support 18. The movement of the carriage plate 11 will then permit of alinement of the predetermined center for the minor portion with the point 20, while lateral movement of the carriage plate 11 with the slides 10 will permit of positioning of the predetermined center exactly over the point 20 when the carriage plate 11 will be locked in position through the locking member 21 and the lens being again firmly pressed downward onto the annulus, will be locked into position by tightening of the locking member 17.

It is then desirable to adjust the lens according to whether a prism is to be ground in the minor portion, face in or out, up or down, this being accomplished by rocking of the bed 8 in the cup 7, to bring the lens into position where the axis of the spindle 4 will be normal to the lens or in desired angle to the lens where the bed 8 is secured in desired adjusted position as by the suitable devices 9. The lens is now in position for grinding.

To grind and polish the new or minor portion on the lens I preferably provide the spindle with the preferably adjustable crank arm 22 whose offset relative to the spindle may be adjusted as desired to vary the size of the minor portion, said crank arm 22 having a depending point 23 adapted to be engaged in the recess 24 of the grinding tool or button 25. This button may be an ordinary solid button or cloth covered polished button such as illustrated in Fig. IV for example, being solid and having merely the central recess 24 to receive the pivot, or it may be one of my improved polishing buttons having a differential movement to insure breaking up of the path of the lines of grinding, as is clearly brought out in Figs. VI and VII.

In either event I preferably form the initial grinding button at least with a plurality of grooves 26, as illustrated in Figs. IV and V, these grooves leading toward the center and facilitating flow of the grinding fluid toward the center of the button and thus insuring a liberal quantity of emery or other grinding fluid being at all times within the tool or lens to prevent scratching or injuring the lens by the tool and insure rapid grinding.

In the form of tool illustrated in Figs. VI and VII, I have shown the button as comprising the shell or grinding portion 25 recessed in its upper face to provide the shoulder 27 and the projecting circumferential flange 28, the button having the central countersunk recess or socket 29 to receive the cone point 30 of the disk 31, the cone point being slightly eccentric to the disk whereby the disk at one side will at all times contact with the flange 28 while being out of engagement therewith at the opposite side and the recess 24 being eccentric to both the pin 30 and the disk 31, as illustrated.

In the operation of my improved grinding or polishing button the point 23 of the crank is engaged in the aperture 24 of the disk and a rapid spinning motion imparted to the tool 25 as an entirety, together with the crank on account of rotation of the grinding spindle 4. In addition, however, to the spinning or movement in a circular path of the button as an entirety as carried around by the crank arm 22, there will be a spinning or twisting movement of the button about the point 23 due to a certain variance in the frictional resistance between the outer and inner portions of the engaging surfaces of the lens and button and also due to the fact that as the button grinds down onto the lens there will be a certain frictional engagement between the side of the button and the edge of the countersink formed in the lens tending to operate as a planetary drive for the button. Additionally, in the form of construction illustrated in Figs. VI and VII, there will be a gradual relative movement of the disk 31 and grinding surface 25 due to the fact that the movement of the crank engaged in the socket 24 eccentric to the disk 25, will cause a certain tilting or rocking movement of the disk 31 on the point 29, each rocking movement temporarily throwing the frictional engaging edge of the disk off the shoulder 27 and flange 28, when the disk will momentarily move without the button, the further rocking movement of the disk again bringing it down into frictional locking engagement with the button to further rotate the button, this movement operating then as an additional break-up to insure against wavy or defective surfaces being formed on the lenses ground.

From the foregoing description taken in connection with the accompanying drawings, the construction and operation of my improved bifocal lens grinder should be readily understood, and it will be seen that it is merely necessary to properly mount the lens to be ground within the lens holder and upon the support 18, to then shift the carriage and bed until the lens is the exact desired relation to the grinding spindle, the curve of the bed and supporting cup being such that tilting movement is substantially about the intersection of the axis of the grinding spindle with the surface of the lens so that the tilting movement will not vary substantially the position to be occupied by the bifocal segment on the surface of the lens, and to then place a suitable grinding tool in engagement with the surface of the lens and apply power thereto. It will be noted that to cause the relative feed of the grinding tool and lens I have shown the spindle 4 as vertically slidable and provided with the spring 32 to actuate it toward the lens, a suitable latch member 33 being employed to hold the spindle in raised position as desired. The grinder having been placed in engagement with the lens it is then merely necessary to suitably supply grinding material in a paste or fluid form to the surface to be operated upon when the tool will produce the desired curve on the lens. While this grinding fluid may be applied in any desired manner, I preferably mount on the base 1 or other suitable part of the machine, a tank 34 having a feed 35 extending to the surface of the lens adjacent the point of the bifocal grinding so that the grinding fluid will be gradually fed from the tank onto the lens and will remain in the cup or trough formed by the concave curvature of the original lens blank and thus insure a sufficient supply of the grinding fluid being at all times on the lens.

I claim:

1. In a machine of the character described, the combination with a base, of a lens carriage plate, slides supporting the carriage plate for longitudinal and transverse movement relative to the base, lens clamping means on the carriage plate to secure the lens for movement with the carriage plate, a grinding spindle, and a lens support mounted in fixed position relative to the spindle for engaging the portion of the lens to be operated upon irrespective of the adjustment of the lens with the carriage plate.

2. In a machine of the character described, the combination with a base, of a tiltable supporting bed carried thereby, a lens support fixed for movement with the bed, and a lens holding device mounted for sliding movement relative to the bed, said lens holding device spanning the support to retain the lens in engagement with the support.

3. In a lens grinding machine, the combination with a base, of a tiltable bed carried by the base, a lens support rising from the bed, a centering point carried by the support, means for clampingly securing a lens in engagement with the support, and means for adjusting the lens and clamping means relative to the support.

4. In a machine of the character described, the combination with a base, of a tiltable supporting bed carried thereby, slides mounted upon the bed for transverse movement relative thereto, a lens support mounted upon the bed, a plate carried by the slides, lens rests carried by the plate, a supplemental plate mounted upon the first plate, additional lens rests carried by the supplemental plate, yielding means for clamping a lens between said rests and locking mechanism for retaining the lens against movement thereof relative to the bed.

5. In a machine of the character described, the combination with a base, of a tiltable supporting bed carried thereby,

slides mounted upon the bed for transverse movement relative thereto, a lens support in the form of an annulus mounted upon the base, a centering point carried by the support, a plate carried by the slides, lens rests carried by the plate, a supplemental plate mounted upon the first plate, additional lens rests carried by the supplemental plate, yielding means for clamping a lens between said rests and locking mechanism for retaining the lens against movement thereof relative to the bed.

In testimony whereof I affix my signature in the presence of two witnesses.

LUCIAN W. BUGBEE.

Witnesses:
H. K. PARSONS,
E. M. HALVORSEN.