

July 17, 1928.

L. W. BUGBEE

1,677,382

PROCESS OF MAKING AND MARKING TORIC AND LIKE LENSES

Filed Nov. 24, 1925

Fig. 1.

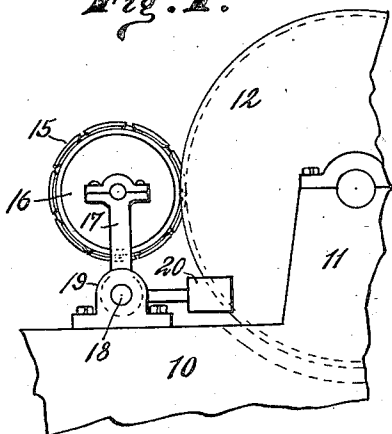


Fig. 2.

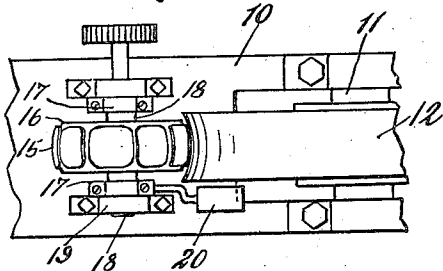


Fig. 3.

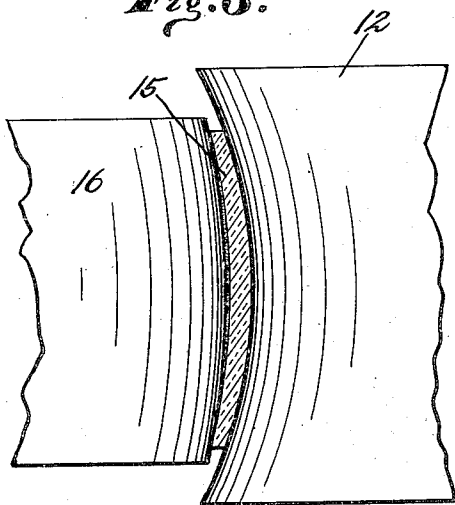


Fig. 4.

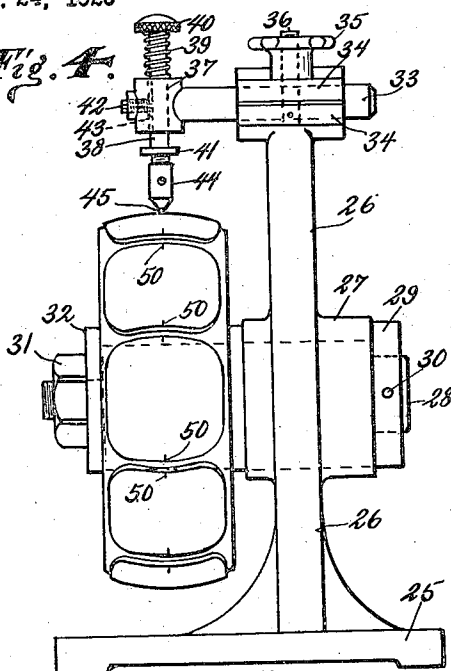
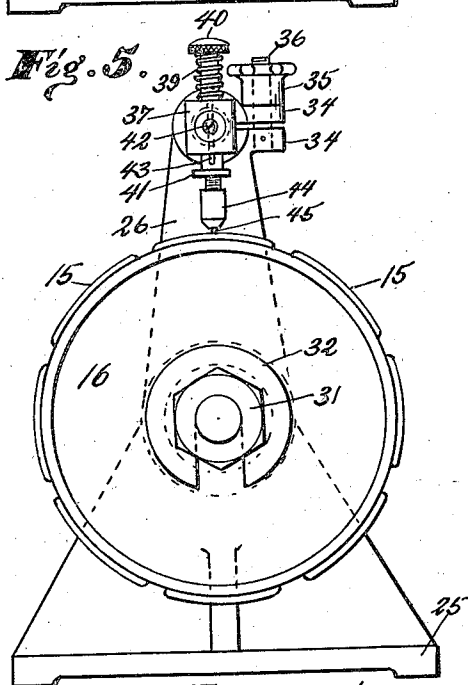


Fig. 5.



Inventor.
Lucian W. Bugbee.

by
Lockwood & Lockwood
his
Attorneys.

Patented July 17, 1928.

1,677,382

UNITED STATES PATENT OFFICE.

LUCIAN W. BUGBEE, OF INDIANAPOLIS, INDIANA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO CONTINENTAL OPTICAL CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE.

PROCESS OF MAKING AND MARKING TORIC AND LIKE LENSES.

Application filed November 24, 1925. Serial No. 71,257.

The chief object of this process is the mechanically accurate determination and marking of the axis or axes in one principal meridian of toric or cylindrical lenses, and chiefly the equatorial line of the lenses. Heretofore such lenses have had their axes marked after they were ground and removed from the lens holder and by means independent of the lens holder on which they were secured while being ground, and by other special marking apparatus or means whereby the operator must locate the axes. The foregoing process has not only been laborious and expensive but inaccurate, because of the change of lens holder and the employment of marking means independent of the original lens holder, as well as the inaccuracy due to the human element involved.

This process eliminates the inaccuracy of the human element as mechanical means determine, both the location of the axes and its indication, and also the marking and the operation of marking means are controlled by the original lens holder on which the lens was ground.

The invention is for the process set forth in my former application for "means for marking a toric lens axis", Serial No. 629,735, filed April 3, 1923.

The chief feature of the invention consists in the determination and indication of the axes of such lenses by the grinding mechanism including particularly the lens holder, and marking the axes of the lens while secured on and before removal from the lens holder used in the grinding process. Therefore the grinding operation determines the location of the axes on the lens holder and the marking is made with reference to the position of the lens on the lens holder, so that there can be no possible inaccuracy such as arises in the methods of marking lenses heretofore employed. While there is shown herein, to explain this invention, a spotting wheel on which a number of toric lenses are similarly and simultaneously ground and marked, this invention is not limited to the employment of such mechanism.

The nature of this invention will be more fully understood from the accompanying drawings and the following description and claims:

In the drawings Fig. 1 is a side elevation of means for grinding toric lenses, parts be-

ing broken away. Fig. 2 is a plan view thereof. Fig. 3 is a plan view of the adjacent operations of the toric wheel and grinding, or remainder being broken away. Fig. 4 is an end elevation of apparatus for marking the lens. Fig. 5 is a side elevation of Fig. 4.

The first step consists in forming the lenses so that the forming means will determine and locate the axes of the lenses on the lens holder. One means for accomplishing this step in the process is that shown in Figs. 1, 2 and 3. There is shown a base 10 having upright bearing stands 11 for mounting a rotatable grinder 12, the periphery of which is concavely curved transversely so as to generate and determine the transverse or meridional curvature of the lenses 15 which are mounted on the periphery of the spotting wheel 16 which rotates tangentially of the grinder.

The spotting wheel 16 is rotatably mounted in the upper ends of bearing posts 17 which extend up from an arbor 18 rotatably mounted in bearings 19 secured on a base 10 of the machine. The spotting wheel is yieldingly forced towards the grinder by a weight 20 extending inward from the arbor 18.

The spotting wheel 16 has a peripheral surface, which is usually spherical, but is adapted to receive and have cemented on it a series of lens blanks, the inner or concave surfaces of which are adapted to fit substantially on the surface of the spotting wheel. Furthermore the transverse curvature of the spotting wheel is usually greater than the transverse curvature of the grinding surface of the grinder and the central axial plane of the spotting wheel coincides with the same plane of the grinder; that is, the equatorial line or line of greatest circumference of the spotting wheel coincides with the equatorial line or shortest circumferential line on the grinding surface of the grinder. The spotting wheel and grinding wheel are rotated preferably in opposite directions or at different speeds, so that the grinder will generate the toric surfaces of the lenses and the meridional curvature of the lenses will be determined by the transverse curvature of the grinding surface of the grinder, and the equatorial curvature of the lenses will be determined by the diameter of the spot-

ting wheel plus the thickness of the lenses when the grinding operation is finished.

After the grinding of the lenses they are removed from the lens holder, or spotting wheel before their axes are marked, but they are left on the lens holder and the lens holder is transferred with the lenses thereon to the marking apparatus shown in Figs. 4 and 5. There is shown a base plate 25 with an upright 26 having in it a transverse bearing 27 for an arbor 28 mounted therein for receiving the spotting wheel. A collar 29 is held by a screw 30 on one end of the arbor and a nut 31 screws on the other end of the arbor against a washer 32 that engages the hub of the spotting wheel.

A marker is mounted on the upper end of the upright 26 by means of an arm 33 being clamped in a split bearing 34 that is clamped by a nut 35 which screws on a nut 36 secured to one side of the lower member of the split bearing 34 and extends loosely up through one side of the other member of the split bearing 34 as seen in Fig. 5. The arm 33 has a head 37 on it with a vertical hole through the same for receiving a marker rod 38 which is vertically reciprocal therein and is forced upward by spring 39 entering said rod and lying between the head 37 and a knob 40 on the upper end of the rod 38. A collar 41 on the lower part of the rod 38 eliminates its upward movement by engaging the head 37. When the rod 38 is not pressed downward the collar 41 rests against the head 23. In the drawings the rod 38 is shown in its downward position. The rod 38 is held from turning by a pin 42 and projects into a vertical groove 43 shown by dotted lines in Fig. 4. The lower end of the rod 38 is threaded to receive a holder 44 or a diamond 45 which does the marking when it is pressed downward as shown.

The marker is adjustable, by the means above described, laterally of the spotting wheel and lenses and it is set so that the axle of the marker rod 38 and center of the diamond 45 will correspond with the equatorial line or line bounding the greatest diameter of the spotting wheel and series of lenses. This equatorial line lies substantially midway between the sides of the spotting wheel, in the preferred form of the apparatus, but not necessarily so.

In operating the marker, the spotting wheel is turned by hand slowly and the opposite edges of the lenses marked at 50 by pushing the diamond 45 down on the lenses, as appears in Fig. 4. In the manufacture of toric or like lenses the spotting wheels and grinders are so made that their equatorial lines are midway between the sides thereof. Then the marker arm 33 is so adjusted as to make the diamond of the marker coincide with the equatorial line of the wheel. One adjustment will be sufficient for the continu-

ous manufacture of a great many lenses without any other alteration or adjustment, and without a great many replacements of spotting wheels, as the spotting wheels for a large line of said lenses would be identical.

The lens blanks 15 are preferably secured on the spotting wheel practically abutting each other substantially as shown although they do not necessarily have to touch each other. And it is desirable to place the blanks midway between the sides of the spotting wheel, although this is not necessary. It is immaterial whether the blanks are placed on the spotting wheel in exact peripheral alinement as shown, for the equatorial axes of them will be located in the same place with reference to the lens holder regardless of the position of the blank. Thus some of the blanks are nearer one side of the spotting wheel than the other, and other blanks were nearer the other side of the spotting wheel, the apparatus would correctly mark the equatorial axes of the lenses because they would of necessity coincide with the equatorial line of the spotting wheel regardless of how inaccurately the blanks are placed.

Thus it is seen that the equatorial axes of these lenses are mechanically determined by the lens holder and the grinder, and by securing the marker and lens holder in the proper relation to each other, the marker can be used for marking the axes of a vast number of lenses without change, and to do it with absolute accuracy, marking every one alike. This is a vast step towards accuracy in marking of individual blanks over the method requiring individual examination by the operator or the removal of the blanks from the holder on which they are secured while being ground and replacing them on another holder for marking.

The invention claimed is:

1. The process of making and marking toric and like lenses, which process consists in securing a lens blank on a lens holder, grinding the blank into a lens by forming a toric surface thereon, marking the said lens while still on the holder with an axis mark coinciding with the equatorial line of the said toric surface as indicated by the equatorial line of the holder, and then removing the lens from the holder on which it was ground.

2. The process of making and marking toric and like lenses, which process consists in mounting the lens blank on a lens holder, grinding the lens therefrom while on the holder so that the axis of the lens will correspond with some indication of said axis made on the lens holder, marking the axis of the lens on said lens while it is still on the holder on which it was generated, and with reference to the indication on the lens holder of the axis of the lens, and thereafter

removing the lens from the holder on which it was ground.

3. The process of making and marking toric and like lenses, which consists in grinding the base curve of the lens blanks so as to be spherical, affixing said spherical surfaces to a lens holder with substantially spherical seats for the lens blanks, grinding the other sides of the lens blanks while on the holder so as to form toric surfaces thereon, whereby the axes of the lenses thereby produced will agree with the equatorial line of the lens holder, and applying a lens

marker to the lenses on said lens holder before their removal but after their being ground, so that the marker will coincide with the equatorial line of the lens holder, and causing a relative movement of the marker and lens holder whereby the axes of the lenses will be marked on the lenses with reference to the equatorial line of the lens holder.

In witness whereof, I have hereunto affixed my signature.

LUCIAN W. BUGBEE.