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H. K. PARSONS

METHOD OF GRINDING LENSES

Filed Aug. 2, 1922

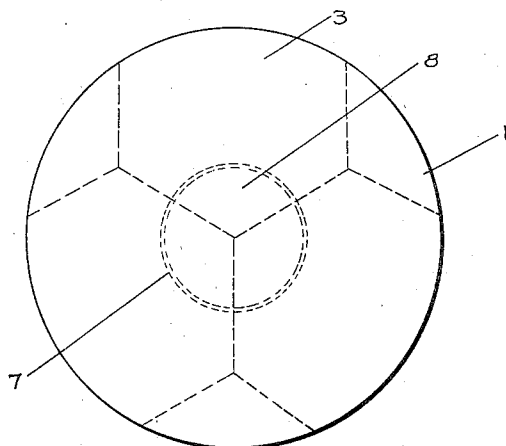


FIG. I

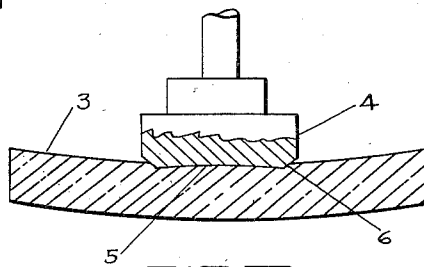


FIG. III

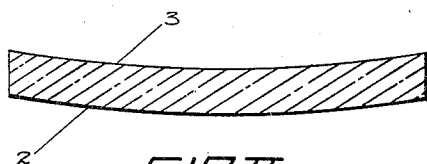


FIG. II

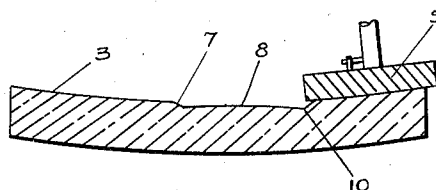


FIG. IV

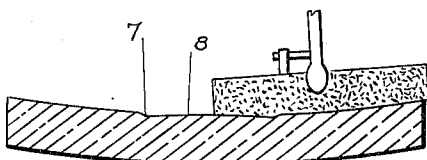


FIG. V

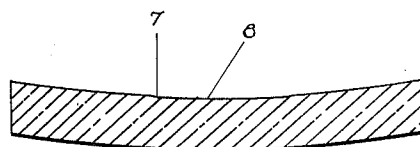


FIG. VI

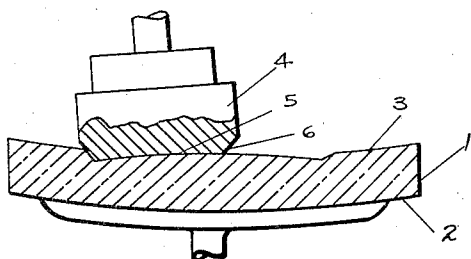


FIG. VIII



FIG. VII

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METHOD OF GRINDING LENSES.

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To all whom it may concern:

Be it known that I, HAROLD K. PARSONS, 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 Methods of Grinding Lenses, of which the following is a specification.

This invention relates to improvements in ophthalmic lenses and process of producing the same, and has particular reference to an improved form of bifocal or multifocal lens and manner in which the same may be produced.

The leading object of the present invention is the provision of a novel and improved form of one-piece bifocal lens which shall present to the casual observer the appearance of a merged surface bifocal lens disclosing no ridge or conspicuous line of joinder between the parts, but which shall be capable of construction or manufacture at a much less cost than that at which it is possible to produce the merged surface lens of corresponding appearance.

A further object of the invention is the provision of a novel and improved process by which a lens of this character may be satisfactorily economically produced, and in which aberration at the line of joinder may be reduced to a minimum.

Other objects and advantages of the present invention should be readily apparent by reference to the following specification taken in connection with the accompanying drawings, and it will be understood that I may make any modifications in the specific details of construction shown and described within the scope of the appended claims without departing from or exceeding the spirit of the invention.

Figure I represents a plan view of a blank used in carrying out my improved processes, the lines on which the blank is divided in producing the finished lenses being indicated in dotted lines.

Figure II represents a sectional view of one initial form which the blank may have.

Figure III represents a similar view showing one of the initial steps in the process of manufacture.

Figure IV represents a view of the blank at the beginning of the next operation.

Figure V represents a view at the completion of said operation.

Figure VI represents a view drawn more nearly to scale of the structure of Figure V.

Figure VII represents a sectional view of a completed lens.

Figure VIII is a view similar to Figure III illustrating a different form of grinding tool eccentrically positioned on the blank.

In carrying out my invention I preferably make use of a large disc 1, as shown in Figure I, which is preferably in a rough or unfinished state on the surface 2, but is formed with a single continuous molded or ground surface 3 on the opposite side. The blank having been properly prepared on the side 3 to the curve which it is desired to have on the distance side of the finished lenses to be produced therefrom, I then centrally abrade the blank as by the positively driven and preferably rigid held tool 4 having a central surface 5 of the curvature which it is desired to impart to the reading portion of the lens, and having flaring portions 6 extending outwardly from the central curved portion 5, these flaring portions 6 being preferably straight in cross section. The tool here disclosed is preferably employed in connection with emery or other suitable abrasive material or may be in the form of a diamond charged lap which will rough out the glass to form the central reading surface 8 and the intermediate zone or connecting portion 7. The tool may either be forced directly down into an either stationary or rotary held blank, or may be offset at an angle and both the blank and the tool rotated as indicated in connection with Figure VIII, in the event that it is desired to use a break up form of grinding instead of a direct concentric sinking of the parts, the latter while possibly slower in operation, avoiding any possibility of concentric rings liable to cause difficulty in subsequent polishing, although both processes may be satisfactorily employed. In either event, the reading curve having been formed, it will be noted that the same is at its edges sunk below the original surface 3 of the blank, the grinding operation being preferably carried on until it has been found that the center point of the reading surface has been

ground or formed to the new curve, this entailing a minimum sinking of the lateral portions below the surface 3.

In this connection I might mention that the structure as shown in Figures III, IV, V and VIII, is an exaggeration to facilitate understanding of the invention, as the actual difference in curvatures is better exemplified by Figures VI and VII, since relatively slight differences in curvature produce considerable difference in optical effect. In any event the central reading portion having been properly formed to curve, I may either immediately polish it or may first additionally grind the surface 3, preferably maintaining the curve originally formed thereon, but removing a portion of this surface by a driven tool 9, as shown in Figure IV, so that this surface is brought down more nearly to the level of the ring or line 10 bounding the reading curve.

It will be understood by reference to Figures IV and V that this downward grinding causes the inwardly extending portion of the tool 9 originally overhanging the bevel surface 7 to gradually come down and remove and restore to original curve portions of the member 7 until but a slight zone 7 is left, which substantially blends into the reading portion curve at the one side and the distance portion at its other side so that there is no apparent ridge, although there is still a difference in height of the two surfaces at their respective termini. The zone 7 is frusto-conical in form, providing a straight inclined shoulder between the reading and distance fields forming a narrow transition zone which the eye readily passes over. The two surfaces having been brought into proper relationship one with the other they may then be either individually or simultaneously polished with a suitable soft or flexible polisher which will conform to the curves and to the intermediate connecting zone, producing a suitable polish over the entire surface so that the blank when completed will have the central reading portion 8 and surrounding distance portion 3 and the intermediate connecting zone 7, but will in fact be what is known as an invisible bifocal or one in which the line of demarcation between the several surfaces is not perceptible when the glasses are in use.

I would call particular attention to the advantage possessed by my process, in that by sinking in the reading portion with the lateral connecting zone and then subsequently grinding down the distance portion, the greater the grinding down effect, the less the width of the connecting zone until the zone can be rendered very slight and yet all possibility of production of a

ridge between the parts is eliminated and the expense attendant upon trying to merge the two surfaces is also done away with, so that the lenses may be very readily and economically produced.

I claim:

1. The process of producing bifocal lenses consisting in centrally abrading the stock for a plurality of bifocal lenses to form a sunken curve having an inclined surrounding wall flaring outwardly therefrom, and subsequently abrading the surrounding surface of the stock to reduce the height of the wall.

2. The process of producing bifocal lenses consisting in centrally abrading material for a plurality of lenses to form depressed reading portions surrounded by an inclined division wall, and subsequently partially reducing the surrounding portion of the material to produce a distant vision curve, said subsequent reduction removing a portion of the surrounding material to lower the height of the connecting wall.

3. The process of producing bifocal lenses consisting in centrally abrading material for a plurality of lenses to form depressed reading portions surrounded by an inclined division wall, subsequently partially reducing the surrounding portion of the material to produce a distant vision curve, said subsequent reduction removing a portion of the surrounding material to lower the height of the connecting wall, and subsequently polishing the reading and distance portions and connecting wall to substantially blend the three one with the other.

4. The process of producing bifocal lenses consisting in forming a blank with the distance vision curve, sinking therein a reading portion curve with an inclined wall intermediate the reading and distance portion curves, and subsequently sinking down the distance vision curve to reduce the height of said wall.

5. The process of producing bifocal lenses consisting in abrading a blank with a tool having a central curve of one dioptic and a laterally inclined wall, and subsequently sinking down the remaining portion of the blank with a tool having a curve of another dioptic to reduce the height of the wall between the two curves.

6. The process of producing bifocal lenses consisting in forming the lens stock with an optical curve of one dioptic, having a straight inclined marginal wall, and subsequently reducing the height of the marginal wall by forming on the remaining high portion of the lens stock an optical curve of another dioptic.

HAROLD K. PARSONS.