

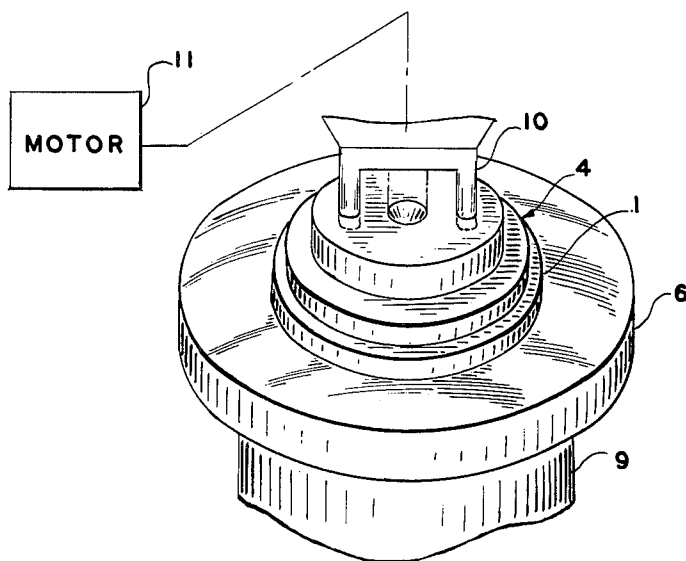
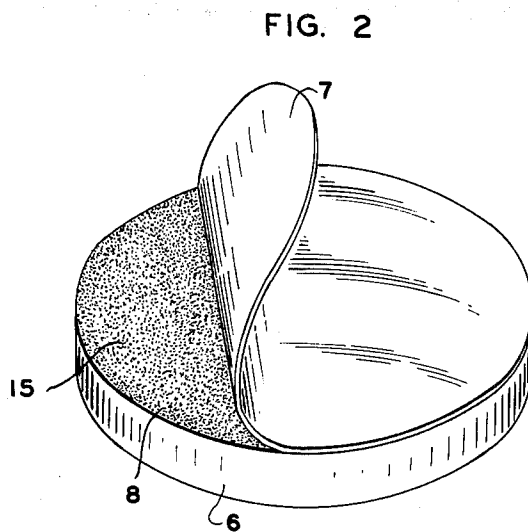
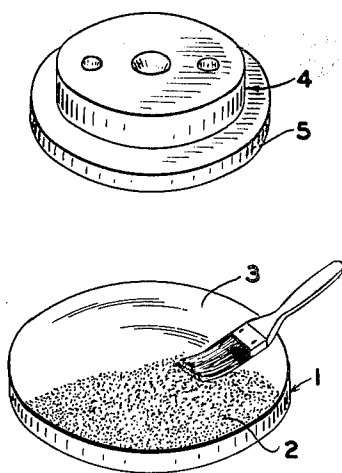
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METHOD OF POLISHING PLASTIC LENSES

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METHOD OF POLISHING PLASTIC LENSES
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This invention relates to a method of polishing lenses and more particularly to a method of polishing plastic lenses.

The conventional grinding and polishing of ophthalmic glass lenses includes a series of grinding operations and a final polishing operation for finishing the lens. The plastic lenses require a new method for grinding and polishing.

Plastic lenses are made of a variety of compositions the more common being CR-39 which is a tradename for a monomer in liquid form of diethylene glycol-bis-allyl-carbonate. Another of such compositions is EGM copolymer formed of ethylene glycol maleate. These compositions form hard plastics which adapt themselves to conventional grinding operations similar to conventional grinding methods for glass lenses. Conventional polishing methods however do not provide the desired finish to plastic lenses of this type. Accordingly, a new method of polishing the plastic lens is necessary to finish a plastic lens once the general curvature and surface as well as thickness is established on the lens element. Accordingly, this invention is a polishing process to provide the final finish on a plastic lens element.

It is an object of this invention to provide a method of polishing a plastic lens.

It is another object of this invention to provide a method of polishing a plastic lens whereby an intimate contact is present between the polishing agent and the plastic lens.

It is a further object of this invention to provide a method of polishing a plastic lens whereby a lubricant, a wetting agent, and a grinding agent in a solution provide the intimate polishing means to give the desired finished surface for plastic ophthalmic lenses.

The objects of this invention are accomplished by a method of polishing a plastic lens. A plastic lens in contrast to a glass lens is resilient permitting a certain amount of spring as the lens is subjected to the stresses inherent in a grinding and polishing operation. Accordingly, a rigid blocking of the lens element is necessary which covers the major surface of the lens blank over the total area which is usable on the finished lens element. This may be accomplished through the use of any suitable bonding agent or blocking means which provides the desired support for the lens element.

A lap is used to support a polishing pad retained on the lap by some adhesive agent. The desired curvature of the lap is preformed and the pad provides the necessary polishing qualities when combined with a slurry in accordance with the invention. A polishing machine provides the mechanical movement of the lens element.

The slurry includes a water miscible lubricant such as glycerine, and water together with the grinding agent of tin oxide and a wetting agent such as tri-sodium phosphate. The proper consistency of this mixture provides the desired grinding qualities necessary for finishing the plastic lens element.

The basic steps and the composition of the slurry are set forth in the following description and illustrated in the attached drawings.

FIG. 1 illustrates a step of applying a bonding agent to the lens element for bonding the lens block to the plastic lens.

FIG. 2 illustrates a step of placing the polishing pad on a lap with an adhesive means.

FIG. 3 illustrates a mechanical means for polishing the lens element.

The process set forth in this invention uses a slurry as described in the following paragraphs. An abrasive agent suspended in an aqueous solution of a miscible lubricant, and a wetting agent provide an intimate contact with the plastic lens element. The lubricant gives a smooth abrasive action with the abrading agent and the wetting agent assists in providing intimate contact of the solution with the lens.

The plastic lens is not a rigid element such as a glass lens and accordingly requires a rigid block to prevent deformation during the grinding process. The polishing pad adheres to the lap to give the proper curvature and carries the slurry to give the abrading action for polishing.

Referring to the drawings, FIG. 1 illustrates the plastic lens 1 on which is being applied a bonding agent 2 to the major surface 3 of the plastic lens. The lens block 4 has a preformed surface 5 mating the major surface 3 of the lens blank. Subsequent to the application of the bonding agent 2 on the major surface 3 of the lens 1 the lens block 4 is pressed firmly against the bonding agent. The bonding agent hardens and fixes the lens block 4 to the lens 1 to provide a rigid blocking for the lens. Any suitable bonding agent and lens block providing this function is adequate.

FIG. 2 illustrates a lap 6 for supporting the polishing pad 7. An adhesive 15 is applied to the polishing surface 8 of the lap 6. The polishing pad 7 is then laid on the surface 8 and firmly fixed to the lap in this manner. Where the curvature of the surface 8 is of such a degree that wrinkling of the pad is caused as it is being bonded to the surface 8 a plurality of slits may be formed removing the excessive portions of the pad 7 about the periphery to prevent such wrinkling. Where the curvature is slight the pad 7 generally is sufficiently flexible to fit the curvature of the surface 8.

A pad suitable for this type of polishing may be a pad of the type available from the Pellon Corporation generally used for polishing lens blanks. In special cases a woven pad impregnated with beeswax is used to improve the polishing of the surface.

Referring to FIG. 3, the lap 6 is mounted on a fixed element 9. The blocked lens 1 is positioned on the adapter 10 of the polishing machine. A suitable mechanical arrangement connects the adapter 10 to the motor 11 to provide the necessary mechanical motion in polishing of the lens.

The slurry consists of tin oxide of particles which are preferably 90% 1 micron or less. The remaining 10% should not exceed 5 microns. The tin oxide is suspended in an aqueous solution of a water miscible oil such as glycerine. The solution also includes a wetting agent such as tri-sodium phosphate. The proportions of the slurry are approximately equal parts of tin oxide and glycerine. Water is added to provide the proper consistency of the solution and sufficient tri-sodium phosphate to form a wetting of the plastic lens surfaces. A water miscible lubricant provides the desired lubricating qualities for a smooth polishing operation and the wetting agent aids in an intimate contact of the aqueous solution with the lens.

The invention includes the following steps. Bonding a lens block to a major surface of the plastic lens element to provide a rigid support of the plastic lens. Bonding a suitable polishing pad to the surfacing area of a lap. Applying a slurry to the engaging surfaces of the lens and the polishing pad as the desired mechanical action is provided for polishing a lens surface.

The preferred embodiment of the invention has been set forth in the previous paragraphs. Although other embodiments of this invention might be described, they are

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believed to fall within the scope of this invention. The following attached claims define the scope of this invention.

I claim:

1. The method of polishing plastic lenses comprising steps, mounting a plastic lens on a rigid lens block, polishing a major surface of the plastic lens with an aqueous solution of water miscible lubricant including a wetting agent and tin oxide of a size less than 5 microns.

2. The method of polishing a plastic lens comprising the steps, mounting a plastic lens on a rigid lens block, bonding a polishing pad to a surfacing means, impregnating the pad with a wax, providing relative movement between the surfacing means and the lens surface and polishing the surface with a slurry including an aqueous solution having a water miscible lubricant, tin oxide having particle size less than 5 microns, and a wetting agent.

3. The method of polishing a plastic lens comprising the steps, fixing a rigid lens block to at least one surface of a plastic lens, attaching a polishing pad to a surfacing means, providing relative motion between said lens and said surfacing means, applying to the pad a slurry including a glycerine water solution, a wetting agent and tin oxide to provide polishing of the surface on said lens.

4. The method of polishing a plastic lens comprising the steps, supporting the plastic lens on a rigid lens block, adhering a polishing pad to a surfacing means, providing relative motion between said surfacing means and said plastic lens, continuously applying a slurry including water, glycerine, tin oxide, and a wetting agent to the

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polishing pad to provide the desired polishing of the lens surface.

5. The method of polishing a plastic lens comprising the steps, fixing a rigid lens block to a plastic lens, bonding the polishing pad to a surfacing means, providing relative mechanical movement between said surfacing means and said lens, polishing the surface of said lens with a slurry consisting of water, glycerine, tin oxide having the majority of particles less than one micron in size, and a wetting agent.

6. The method of polishing a plastic lens comprising the steps, mounting a plastic lens on a rigid supporting lens block, fixing a polishing pad to conform to the contour of a surfacing means, impregnating the pad with beeswax, applying a slurry of an aqueous solution including, water, glycerine, tin oxide of particles less than 5 microns in size, and tri-sodium phosphate as a mechanical motion provides relative movement between said plastic lens and said surfacing means.

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