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METHOD FOR FINISHING HARD-PLASTIC
LENSES FOR EYEGLASSES

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1 Claim. (Cl. 51-284)

The present invention relates to a method for final grinding and polishing of the surfaces of hard-plastic lenses, particularly of the type used in eyeglasses, also called ophthalmic lenses, by means of a finishing compound which is capable of being used for the final grinding and for the final polishing of such lenses; and by means of a method for conducting such operations by embedding and infixing a plastic lens in a matrix whereby the lens does not become deformed by stress or loosened by vibration, and is rigidly supported.

Other objects and advantages of the invention will become apparent from the following detailed description.

The long-established practice in the manufacture of ophthalmic lenses made from glass blanks is the grind the lenses by means of tools, usually made of cast iron, called laps or chucks. In the series of grinding operations performed on each lens, successively final material is used for each operation. After four or five such grinding operations, the glass lens, having been subjected to the preliminary stages of surface conformation, is ready for the final stages.

By way of contrast, a hard-plastic lens is amenable to the preliminary, crude, forming operations, such as with the use of a diamond-wheel generator to attain the first approximation of the optical surface. The lens is thus readied for the stages of final grinding and polishing. These lattermost stages, whereby an optically usable lens is produced, comprise the critical part of my invention.

It may be thought that soft-plastic lenses, such as the thermoplastics, may also be subjected to the foregoing sequence of preliminary operations, but it is found in practice that such lenses are too soft, deformable and distortable for such operations. As a consequence, they are preformed as a lens shape by an entirely different method, that is, by molding; and they are not subjected to grinding operations.

By a soft plastic lens, I mean an optically clear lens which has a hardness, as expressed on the M-scale, in the range of 65 to 95. By a hard-plastic lens, I mean a lens, also optically clear, which has an M-scale hardness in the range of 95 to 120, or above. Such hard-plastics are usually, but not always, thermosetting plastics. Examples of such plastics are an allyl diglycol carbonate compound known as CR-39; a cast polyester material known as Sierracin; and a polymethyl alphachloro acrylate compound known as Gafite.

The aforementioned hard-plastic compounds are itemized by way of selection, as examples, there being other plastics useful in attaining the objects of this invention. A principal criterion of usefulness of a particular plastic for this purpose is its hardness, rather than its specific chemical formulation, or its thermophysical properties—that is, whether thermosetting or thermoplastic. It is desirable that the plastic, have along with hardness, a high degree of resistance to abrasion. Thus this phase of the invention relates principally to the physical qualities of the plastic, rather than to its chemical composition.

Beginning at the point of final grinding and polishing,

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with glass lenses, it is customary to conduct the final grinding with what the industry terms "optical powder," and to conduct the final polishing with a material such as rouge powder.

But the final grinding and polishing of a hard-plastic lens is not accomplished by such means, as the surface is left abraded, pitted and scratched thereby, or if the abrading material is too soft, no abrasive action is accomplished. I have found that the compound, stannic oxide, SnO, when used in the finely powdered form, preferably about 300-mesh, is the agent, which, when used in the final grinding and polishing, produces an optically clear, transparent and shiny surface on the hard-plastic lens. I have also found that the conjunctive use of enough water to make a suspension or slurry, and a small amount of chalk, expedite these finishing processes.

In the lense grinding art it is customary to use the grinding compound and water to produce a slurry which is readily employable in the particular grinding facility. The exact amount of water varies according to type of machine being used, and other factors, and the amount is determined empirically. The compounds is mixed with water to form a suspension having a Baumé gravity of from about 30 to 40. The slurry can also be prepared in an empirical fashion by adding 5 heaping tablepoonsful of the stannic oxide to a pint of water, and stirring to a uniform suspension.

I also prefer to include in my grinding and polishing compound, a small amount of talc or chalk, amounting to about 5% of the total weight. Being non-abrasive, this acts as a filler and carrier of the other ingredients. I prefer, too, to add a few drops of oil as a lubricant.

In the ophthalmic lens grinding industry, the surface area of the chuck which holds the lens for grinding is substantially smaller than that of the glass lens which is placed against it. This is because the glass already has the inherent rigidity to be so mounted, and does not require extensive support or backing. Plastic lenses mounted in the same way, are however, deformed by the stresses and strains of the grinding and polishing operations.

I have discovered that the deleterious effects may be prevented, and the plastic lens ground true, by completely covering, or substantially covering the back surface of the plastic lens to be ground with a thick layer of optical pitch or other matrix, thus bracing the perimeter not directly supported by the chuck.

The layer need be only thick enough to supply a cushioning effect. The chuck is prepared to receive the coated lens by mounting on to it, by means of a collar, a circular fibre-board or other rigid surface having a curvature and area conformant to the back of the lens about to be received. The coated back surface of the lens is then affixed to the chuck-mounted surface ready to receive it, and upon hardening, the plastic lens is very securely and rigidly mounted for the grinding and polishing operations. Pitch may also be applied to both the plastic blank and the face of the chuck, then pressing them together. The blank can also be pressed onto the warm pitch suitably coated on the face of the chuck.

I have found that for the production of a finished plastic lens in accordance with my discovery, that it is preferable to use the two elements of my discovery in sequence, that is, as above described, first to mount the plastic lens, and second to use the specified grinding and

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polishing compound—the one step being a complement to the other. Insecure mounting of the plastic lens will result in erratic grinding, and use of a conventional grinding and polishing compound will result in pitting and abrasive defects.

Although I have described my invention in its preferred form, as required by the patent statutes, I desire to be limited only by the scope of the appended claim.

I claim:

In the grinding and polishing of a hard-plastic lens, 10 the steps of mounting the lens by its back surface to a mounting surface, conformed in surface and area to

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said back surface, utilizing a hardenable adhesive matrix, and grinding and polishing the front surface of the mounted lens with an aqueous suspension of stannic oxide, the particle size of the stannic oxide being on the order of 300-mesh.

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