Sept. 13, 1966 L. A. BUCKMINSTER 3,271,912

LENS BLOCKS

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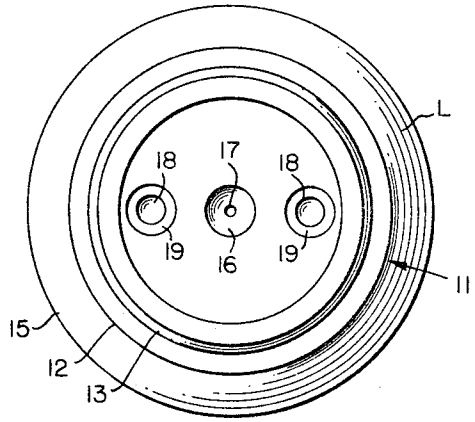


FIG. 1

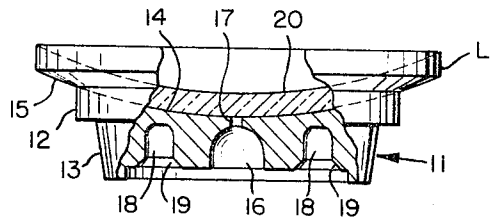


FIG. 2

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LENS BLOCKS

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Application Aug. 2, 1962, Ser. No. 214,261, which is a division of application Ser. No. 4,950, Jan. 27, 1960, now Patent No. 3,192,676, dated July 6, 1965. Divided and this application Mar. 1, 1965, Ser. No. 435,801

2 Claims. (Cl. 51—216)

This is a division of my application Serial No. 214,261, filed August 2, 1962, now Patent No. 3,192,676, granted July 6, 1965, which was a division of my application Serial No. 4,950, filed January 27, 1960, now Patent No. 3,049, 766, granted August 21, 1962.

The present invention relates to the manufacture of lenses for spectacles, and more particularly to lens blocks for holding lenses so that they can be chucked in machines for generating and polishing their surfaces.

In conventional processes for manufacturing an ophthalmic lens, a lens blank of molded glass is ground and polished on each of its two sides successively and then is ground on its perimeter or edge. Usually one side is concave and the other is convex; and the two surfaces have different curvatures so that the thickness of the lens varies at different points. The shapes and spatial relation of the two surfaces determine the desired optical refraction.

For the grinding and polishing operations, it is customary to secure the blank by means of an adhesive, such as molten pitch, to a lens block so that the lens may be chucked in the grinding and polishing machines.

The principal difficulty in blocking an ophthalmic lens is in connection with a semi-finished lens, that is, a lens blank one side surface of which has already been ground and polished. The operation of grinding and polishing the unfinished side of the lens is the more exacting operation because the second to-be-finished surface must not only have the correct curvature, but must bear an exact and precise relation to the first-finished surface, in order for the lens to have the ophthalmic properties desired.

Aside from the problems relating to the fixing of the lens correctly on the lens block and in the chucks, there are other difficulties attendant upon prior blocking practices. For instance, in prior blocking practice the blocking bodies are used over and over again. The result is that they get beat-up in use. This affects the accuracy of the centering of a lens in the different machines in which it is to be worked, with the result that it affects the accuracy of the lens itself.

Moreover, the practice heretofore has been to lay the lens out and to mark it, then to block it with pitch on the mounting block, then to surface it, then to take it off the blocking body, to measure it, then to remark it for the finishing operation, and then to effect edging. Each time that the lens has to be removed from a block, however, it entails the irksome job of cleaning pitch off the lens and off the block; and each time that a lens has to be blocked it involves the nasty job of applying pitch to the lens or block.

An object of this invention is to provide an improved lens block by which a lens blank may readily be chucked in a grinding and polishing machine.

Another object of the invention is to provide a lens block which will enable the thickness of a lens to be measured while the lens is affixed to the block.

Other objects of the invention will be apparent hereinafter from the specification and from the recital of the appended claims when considered in conjunction with the accompanying drawing.

In the drawing:

FIG. 1 is a bottom plan view of a lens block made in accordance with one embodiment of this invention, and showing a semi-finished lens blank secured to the top of the block; and

FIG. 2 is a part side elevation, and part diametral sectional view of the lens blank and this block.

My above-noted patents disclose the processes and apparatus for manufacturing lens blocks of the type claimed herein. By way of review, a lens blank is held in position on top of a mold, and a heated low-melting-point alloy is flowed into the mold under one side of the lens blank, and is then allowed to cool adhering itself to the blank. The mold is shaped so that the alloy will cool to the shape of a lens block.

In the embodiment of this invention, which is illustrated in FIGS. 1 and 2, the molded block is of a type that will serve only during generating and polishing of the upper, unfinished side surface of the semi-finished lens blank. For edging, this molded block has to be removed, and the edging operation has to be carried out in the usual manner.

After the molded block has served its purpose, it can readily be removed from the lens blank, as, for instance, by putting it into a small vice and squeezing on the block to cause it to break away clear of the blank. The removed block can be melted down again and used in molding another block for another lens blank. Thus, each time a lens blank is blocked by the process of the present invention, a new, clean, unmarred, accurate block is provided.

Referring now to the drawing, **11** denotes a lens block for holding a lens blank L during the surfacing of the latter. The block **11** comprises a generally cylindrical head portion **12**; and an integral, inverted, frusto-conical shank portion **13** projecting coaxially from the underface of the head portion. The upper face **14** of the head portion **12** is shaped in the molding process to conform to the shape of the underface **15** of the lens blank, to which the head is attached. It is a substantially smooth, concave surface. As illustrated, the shank portion **13** is relatively short; and the maximum overall axial length of the block **11** is approximately equal to the maximum overall axial extent of the blank L, that is, to the axial length of the blank between parallel planes tangent to it around its periphery and at the center on its convex side.

The shank portion **13** of the block has three holes arranged in a line diametrally of the block. The center hole has a dome-shaped portion **16**, which is disposed coaxially of the block, and a reduced diameter portion **17** which extends from the inner, dome-shaped portion coaxially thereof to the surface **14**. The other two holes also have dome-shaped portions, here denoted at **18**, but they are not as deep as the center hole and do not communicate with the concave surface **14** in the head portion **12**. They are radially spaced equal distances from the center hole, and are disposed at opposite sides of the center hole in diametral alignment therewith. They are identical in configuration, but are of reduced diameter compared to the center hole. The wall of each portion **18**, moreover, flares outwardly at its bottom as denoted at **19**.

Preferably the material used for the lens block **11** is a low melting point (for instance 136° F.), electrically-conductive alloy made, for instance, of a mixture of bismuth, lead, tin, indium and cadimum. As disclosed in my above-noted patents, the block **11** is adapted to be molded directly onto the convex underside of the lens blank L to provide a means for chucking the lens in a surfacing machine. A lens blank is held in position on top of a mold, and a heated, low melting-point alloy is flowed into the mold under the lower face of the lens blank, and is then allowed to cool adhering itself to the blank. The mold is

shaped to the desired shape of the lens block. An opening in the bottom of the mold is closed by a piston having on its face three pins, which project into the mold cavity to form the recesses **16** and **18** in the molded lens block **11**. After the lens block **11** has cooled and set, this piston is moved upwardly to eject from the mold the lens block **11** which, as a result of the molding operation, has adhered itself directly to the lens blank L. The two recesses **18** in the block are adapted to accommodate two driving pins of the spindle or arbor of a generating or surfacing machine; and recess **16** is adapted to receive the driving pin of a sphere surfacer, when a spherical surface is to be ground on a lens blank. The portion **17** of the central hole permits measurement of the thickness of the lens without removing the lens from the block. By engaging one jaw or feeler of a caliper with the underside **15** of the lens blank through hole **17**, and engaging the other jaw or feeler of the caliper with the upper side **20** of the blank, the thickness of the blank can be read directly. Previously it was impossible to measure a lens once it had been blocked, unless the lens were first removed from the block.

After the operations on the blank have been completed, the block **11** may be readily removed from the blank by squeezing it between the jaws of a vise, as described above, to cause the block to break away clear of the blank.

From the foregoing it will be apparent that applicant has provided a lens block which is relatively simple to manufacture, and which largely eliminates the errors due to damage to lens blocks by repeated use. Moreover, unlike prior lens blocks, it is possible to measure the lens-thickness without removing the lens blank from the lens block.

While the invention has been described in connection with a specific embodiment thereof, it will be understood that it is capable of further modification, and this application is intended to cover any variations, uses, or adaptations of the invention following, in general, the principles of the invention and including such departures from the present disclosure as come within known or customary practice in the art to which the invention pertains and as may be applied to the essential features hereinbefore set forth, and as fall within the scope of the invention or the limits of the appended claims.

Having thus described my invention, what I claim is:

1. The combination with a lens blank, of a lens block for holding the blank in a machine during processing of the blank,

(a) said block being a metallic alloy having a lower melting point than said lens blank and having one end face molded on said blank to conform in shape to and directly adhered to one face of said blank,

(b) said block having an integral relatively short shank, the maximum overall axial extent of the block being approximately equal to the maximum overall axial extent of the blank,

(c) said shank having two recesses, which extend partway only into said shank for receiving driving pins of the machine, said recesses extending toward said one end face from the end of said shank opposite to said one end face, and

(d) said shank having therethrough a separate hole which extends from said opposite end of said shank centrally of said shank through to said one end face, thereby permitting gauging of the thickness of the lens blank which is held by said block.

2. The combination claimed in claim **1**, wherein said hole is disposed between said recesses and communicates itself at said opposite end of said shank with an approximately hemispherical recess which is disposed between said two recesses and through which said block may be driven during processing of the lens blank.

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